CHAPTER 10

DEMAND OXYGEN REGULATOR

TYPE CRU-103/P, P/N F241-2300-3

Section 10-1. Description

10-1. GENERAL.

10-2. The Demand Oxygen Regulator, Type CRU-103/P (P/N F241-2300-3, figure 10-1) is manufactured by Carleton Technologies Inc. (CAGE 04577). It is designed to regulate oxygen to the aircrewmember during flight. The regulator is a chest-mounted, positive pressure, g-modulated regulator that provides demand oxygen flow to the aircrewmember, Pressure Breathing for Altitude (PBA), and Pressure Breathing for gs (PBG). Table 10-1 contains the leading particulars for the regulator.

10-3. The regulator is a chest-mounted, positive pressure, g-modulated regulator that provides demand oxygen flow to the aircrewmember, Pressure Breathing for Altitude (PBA), and Pressure Breathing for gs (PBG).

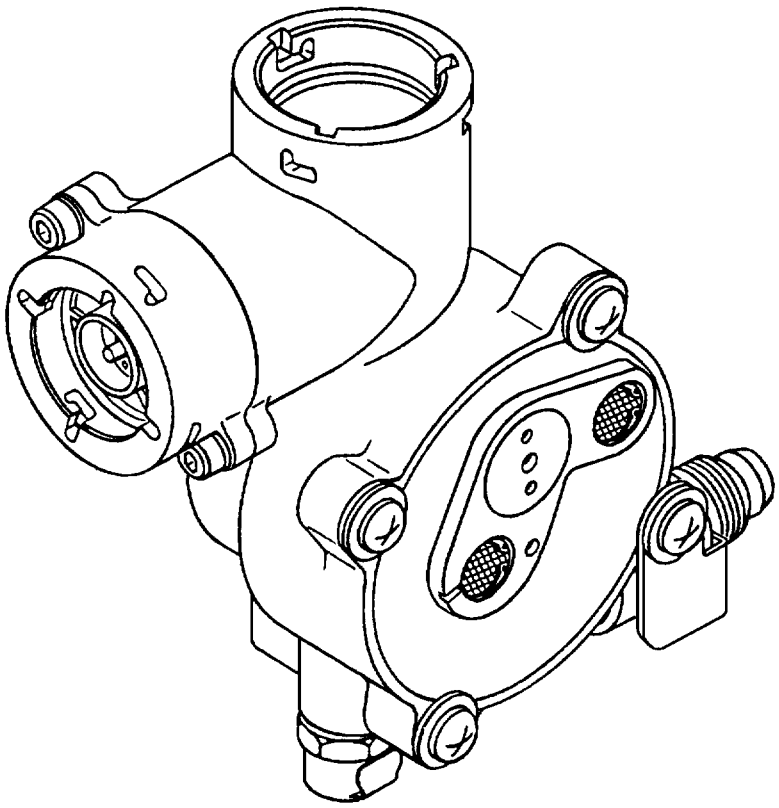

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Figure 10-1. Demand Oxygen Regulator, Type CRU-103/P

Table 10-1. Leading Particulars

Recommended Inlet Pressure	5 to 120 psig
Flow	0 to 240 lpm
Operating Altitude Range	0 to 50,000 ft
Operating Temperature Range	-65° to +160°F
Weight (approx)	12 ounces
Dimensions (approx)	3 x 4 x 2 inches

WARNING

At no time should the demand oxygen regulator, Type CRU-103/P, be used at operational altitudes above 50,000 feet. Life support requirements cannot be reliably maintained by the regulator above specified altitudes.

10-4. The safety pressure feature of the Type CPU-103/P regulator automatically maintains a positive pressure in the mask of 0.5 to 1.8 inches of water (inH_2O) at all altitudes up to approximately 34,000 feet. The pressure-breathing feature maintains a positive pressure in the mask of up to 20.0 inH_2O at altitudes between 34,000 and 50,000 feet, with the positive pressure increasing in proportion to the altitude. Oxygen demand regulators can be used routinely up to 43,000 feet, and up to 50,000 feet for short periods in case of an emergency.

10-5. CONFIGURATION.

10-6. Demand Oxygen Regulators are designed for use with the MBU-20P series oxygen mask as part of the oxygen system in aircraft with liquid oxygen systems (LOX) or on-board oxygen generating systems (OBOGS). See figure 10-1A for proper OBOGS, LOX, or E-2C Configuration.

10-7. FUNCTION.

10-8. Characteristics and performance for which the regulator is designed are described in the following paragraphs. The regulator is shown in figure 10-2. Index numbers of components shown in the figure are referred to in parenthesis in the following discussion of regulator operation.

1. Pressurized oxygen, in the range of 5-120 pounds per square inch gage (psig), is supplied to the regulator at breathing gas inlet (1). This gas is provided by the aircraft liquid oxygen (LOX) system, or the on-board oxygen generating system (OBOGS). A pressure balanced demand valve (2) is used to minimize the effects of differing inlet pressures, demand valve (2) is actuated by bell crank mechanism (3) with force from safety pressure spring (4) and the differential pressure across breathing diaphragm (5). In the pressure demand mode, the aircrewmember inhales, thereby lowering the pressure at the regulator outlet. This pulls breathing diaphragm (5) down (due to the pressure difference) and opens demand valve (2) to provide oxygen flow to noise attenuator (20) and mask outlet (15).

2. To provide PBA, positive pressure that is controlled by PBA aneroid assembly (7), is applied to the top of breathing diaphragm (5) by the PBA subsystem. The PBA subsystem consists of the PBA aneroid assembly (7), ambient vent (8), lapped metal to metal valve (9), and spring (10). A constant bleed through the breathing diaphragm bleed orifice (6) provides a slow flow of oxygen through the PBG and PBA subsystems to ambient vent (8). As altitude increases, PBA aneroid assembly (7) expands and restricts the bleed flow through ambient vent (8), thereby increasing pressure above breathing diaphragm (5) and opening demand valve (2) to provide positive oxygen flow to the aircrewmember through noise attenuator (20) and mask outlet (15).

3. To provide PBG, PBG bellows assembly (11) is pressurized by an externally provided anti-g reference pressure that is supplied to the regulator at anti-g ref pressure inlet (21). The PBG bellows assembly (11) controls positive pressure applied to the top of breathing diaphragm (5). The PBG subsystem includes PBG bellows assembly (11), lapped metal to metal valve (12), diaphragm (14), and spring (13). A constant bleed through breathing diaphragm bleed orifice (6) provides a slow flow of oxygen through the PBG and PBA subsystems to ambient vent (8). As the anti-g reference pressure increases, PBG bellows assembly (11) expands and restricts the bleed flow through ambient vent (8), thereby increasing pressure above breathing diaphragm (5) and opening demand valve (2) to provide positive oxygen flow to the aircrewmember. Diaphragm (14) pressure balances valve (12) so PBA pressure does not affect PBG. The higher of the desired PBA or PBG pressure is provided by the regulator.

4. In the event of an explosive decompression or failed anti-g valve, relief valve (23) limits the internal g signal to approximately 11.5 psig regardless of applied g signal value.

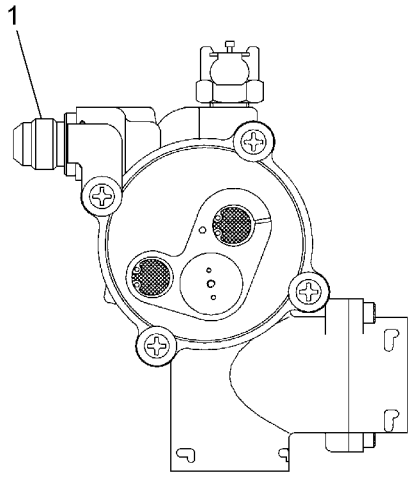
5. The regulator has two outlets that provide breathing gas at the appropriate pressure. Mask outlet (15) connects to the breathing hose of the MBU-20/P mask and tensioning bladder. Vest outlet (16) connects to the vest hose of the CSU-17/P counter pressure vest. Vest outlet (16) includes check valve (17) and vest relief valve (18). When the vest is not connected, vest relief valve (18) limits the breathing pressure to a value between 20 and 24 inches of water.

6. Main relief valve (19) is designed to open and vent to ambient at a minimum of 30 inH_2O and reseat at approximately 30 inH_2O. In addition, main relief valve (19) can be opened by outlet pressure in excess of the required PBA or PBG schedule. This venting is caused by breathing diaphragm (5) moving upward, rotating bell crank (3) counterclockwise which pushes main relief valve (19) open allowing excess pressure to escape to ambient.

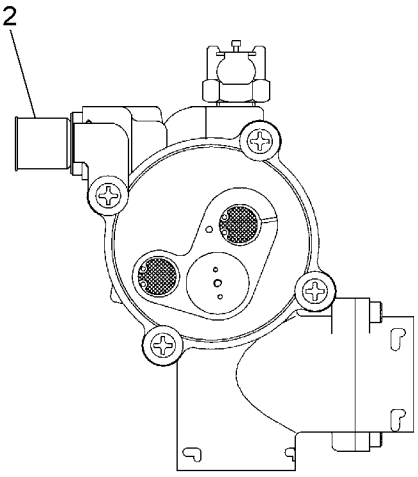
7. Bell crank mechanism (3), that pulls demand valve (2) open on demand, is linked to breathing diaphragm (5). It allows the tension shaft to slide through one crank arm so that an opposite arm can push open main relief valve (19) and vent excess pressure sensed by breathing diaphragm (5). The longer arm on the bell crank (3) is connected to the breathing diaphragm (5). Compression spring (22), positioned between bell crank (3) and demand valve (2), increases the closing force to demand valve (2) during overpressure venting, but does not increase the opening force for demand valve (2) in the demand mode.

10-9. REFERENCE NUMBERS, ITEMS, AND SUPPLY DATA.

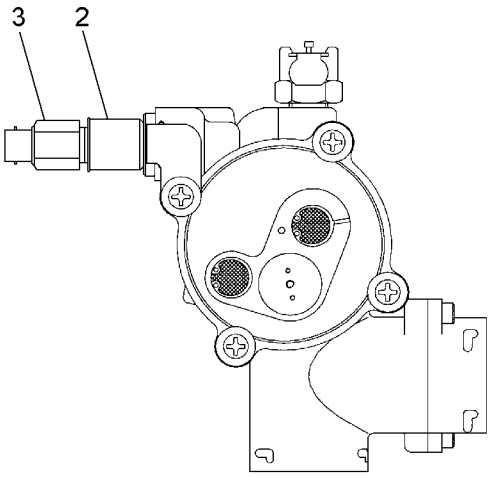
10-10. The Illustrated Parts Breakdown, Section 10-5, contains information on each assembly, subassembly and component part of the Type CRU-103/P demand oxygen regulator. The figure and index numbers, reference or part number, description and units per assembly are provided with the breakdown.



VIEW 1. OBOGS CONFIGURATION



VIEW 2. LOX CONFIGURATION



VIEW 3. E-2C CONFIGURATION

1. OBOGS INLET FITTING
   P/N F395-1106-1
2. LOX INLET FITTING
   P/N B40918-1 (SEE NOTE 1)
3. E-2C INLET FITTING
   P/N 36728-01 (SEE NOTES 1
   AND 2)

NOTES:

1. ENSURE PIPE THREADS OF ITEM 3 AND MALE ADAPTER FOR LOX AND E-2C CONFIGURATION ARE WRAPPED WITH ANTI-SIEZE TAPE PRIOR TO SCREWING INTO LOX INLET FITTING (2).

2. P/N 36728-01 MUST BE ORDERED OPEN PURCHASE FROM SCOTT AVIATION, CAGE 53655, BUFFALO NY.

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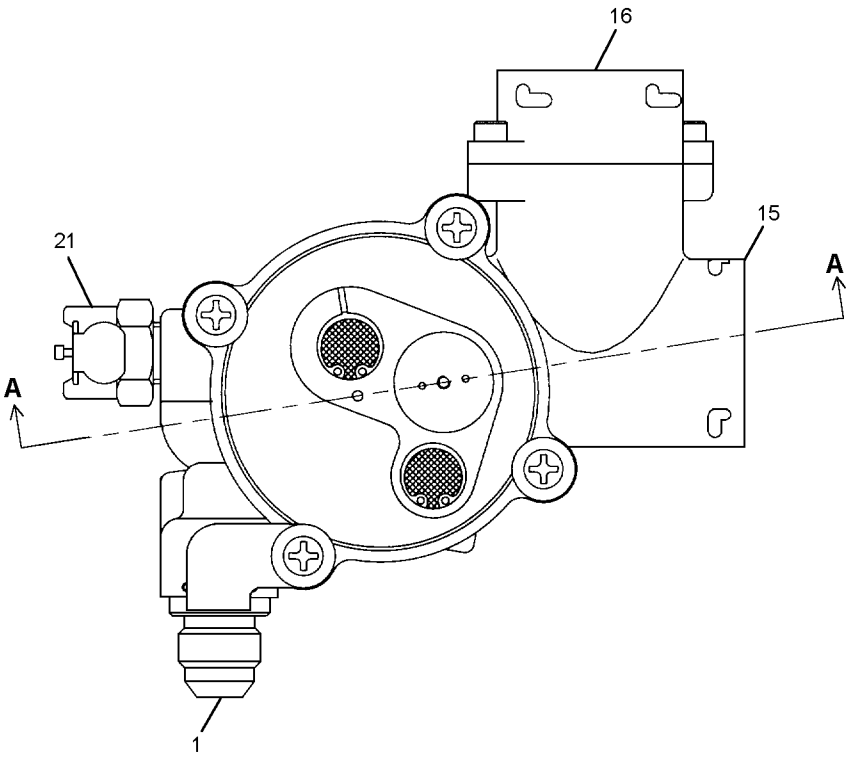
Figure 10-1A. Demand Oxygen Regulator, Type CRU-103/P, OBOGS, LOX, and E-2C Configurations

1. BREATHING GAS INLET
2. DEMAND VALVE
3. BELL CRANK
4. SAFETY SPRING
5. BREATHING DIAPHRAGM
6. BLEED ORIFICE
7. PBA ANEROID ASSY
8. AMBIENT VENT
9. VALVE
10. SPRING
11. PBG BELLOWS ASSY
12. VALVE
13. SPRING
14. DIAPHRAGM
15. MASK OUTLET
16. VEST OUTLET
17. CHECK VALVE
18. VEST RELIEF VALVE
19. MAIN RELIEF VALVE
20. NOISE ATTENUATOR
21. ANTI-G REF PRESSURE INLET
22. COMPRESSION SPRING
23. RELIEF VALVE



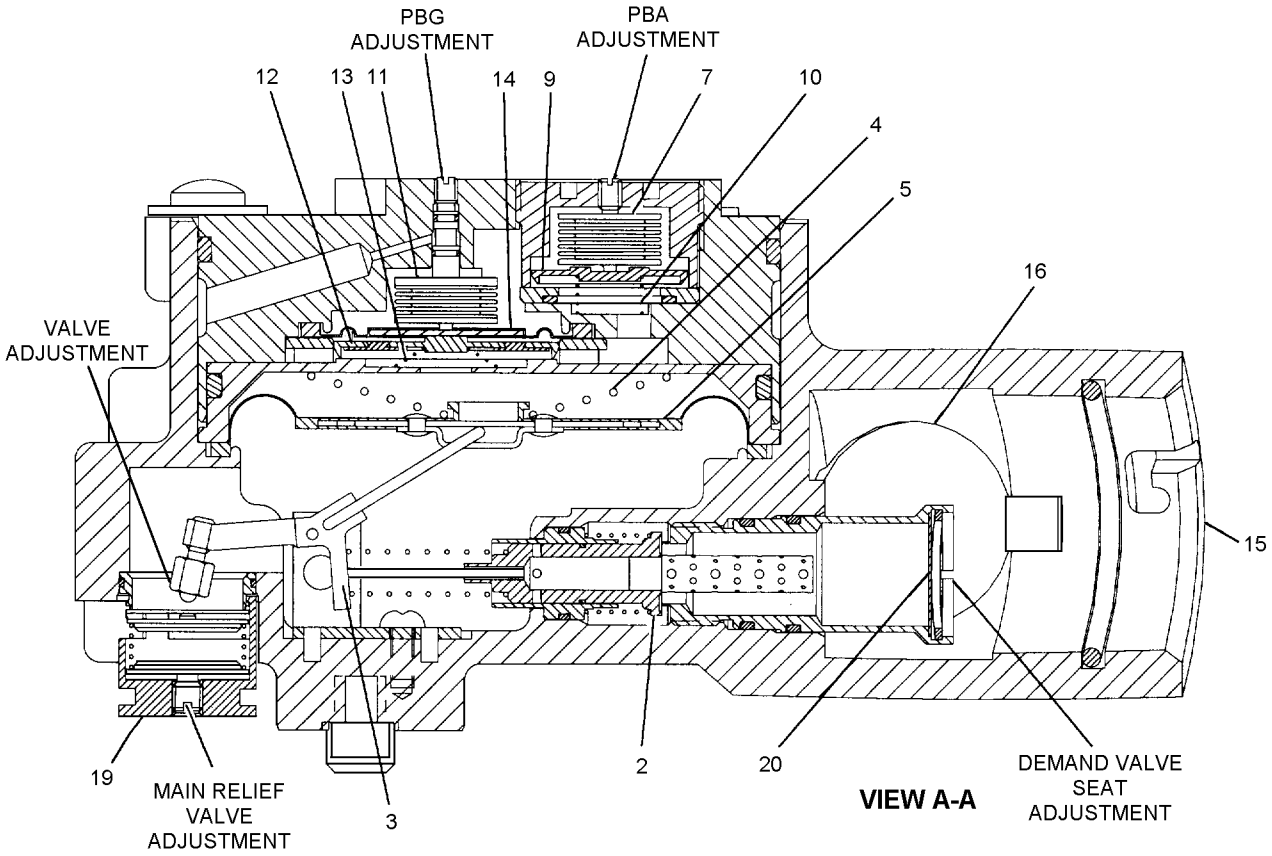


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Figure 10-2. Demand Oxygen Regulator Schematic (Sheet 1 of 2)

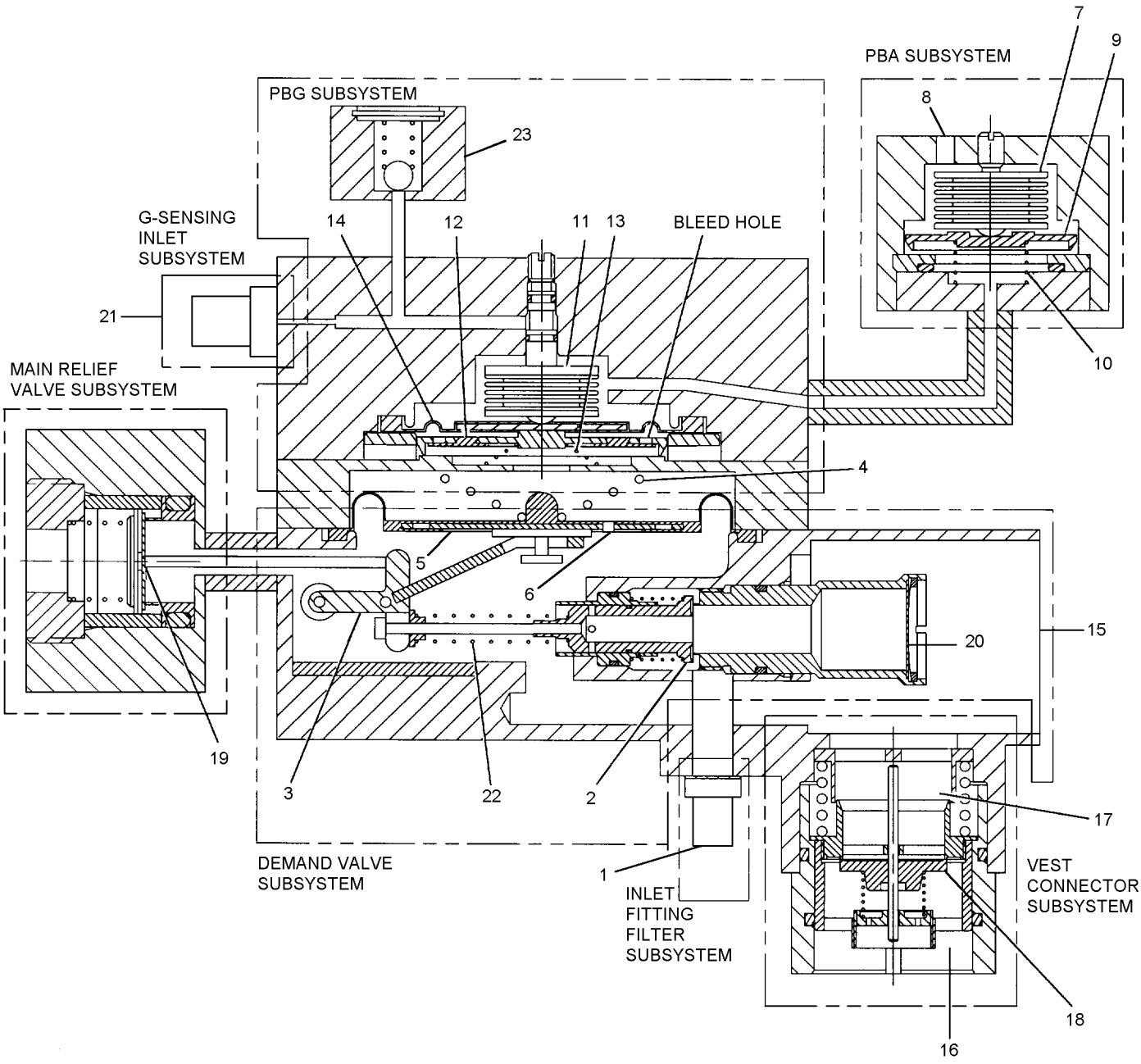

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Figure 10-2. Demand Oxygen Regulator Schematic (Sheet 2 of 2)

Section 10-2. Modifications

10-11. GENERAL.

10-12. The Demand Oxygen Regulator, Type CRU-103/P should be updated by comparing the configuration of the regulator with the directives listed in table 10-1A.

Section 10-3. Performance Test Sheet Preparation

10-13. GENERAL.

10-14. Preparation of the Demand Oxygen Regulator Performance Test Sheet used during Bench Test requires that all actual flow values provided in this section be converted to indicated flow values. Actual flow values are stated in liters per minute (lpm), a value which cannot be measured by the manometers used in the oxygen systems test stands. The test stand manometers are calibrated to indicate inches of water (inH_2O) pressure. Conversion of actual flows (lpm) to indicated flows (inH_2O) can be accomplished using the various graphs which are prepared for, and accompany each individual test stand. Note that 0 liters per minute need not be converted, since 0 lpm = 0 inH_2O.

NOTE

The various graphs supplied with each Oxygen Systems Components Test Stand, Model 1172AS100 or Model 1316AS100 are used in converting flows. The graphs supplied are not interchangeable between test stands.

10-15. The Performance Test Sheet shall be prepared as shown in figure 10-3. The Performance Test Sheet illustrated is a sample only, but may be reproduced for local use.

Table 10-1A. Demand Oxygen Regulator, Type CRU-103/P Directives

Description of Modification	Application	Modification Code
Modification of the G-inlet Fitting	CRU-103/P	670

REGULATOR PERFORMANCE TEST SHEET
DEMAND OXYGEN REGULATOR TYPE CRU-103/P

DATE: _____ REGULATOR SERIAL NO: _____ TEST STAND SERIAL NO: _____

TECHNICIAN: _____ CDI: _____

1. MAIN RELIEF VALVE OVERLOAD TEST (LOW PRESSURE):
   RELIEF VALUE (3.8 INH_2O MIN, 10 INH_2O MAX) _____ INH_2O

2. VEST RELIEF VALVE OVERLOAD TEST:
   INITIAL DESIGN BLEED _____ CCM
   INITIAL SAFETY PRESSURE _____ INH_2O
   RELIEF VALUE (20 INH_2O MIN, 24 INH_2O MAX) _____ INH_2O
   FINAL DESIGN BLEED (INITIAL ±100 CCM) _____ CCM
   FINAL SAFETY PRESSURE (INITIAL ±0.5 INH_2O) _____ INH_2O

3. MAIN RELIEF VALVE OVERLOAD TEST (HIGH PRESSURE):
   INITIAL DESIGN BLEED _____ CCM
   INITIAL SAFETY PRESSURE _____ INH_2O
   RELIEF VALUE (30 INH_2O MIN, 36 INH_2O MAX) _____ INH_2O
   FINAL DESIGN BLEED (INITIAL ±100 CCM) _____ CCM
   FINAL SAFETY PRESSURE (INITIAL ±0.5 INH_2O) _____ INH_2O

4. OVERALL LEAKAGE TEST:
   900 CCM ALLOWABLE LEAKAGE _____ CCM

5. DEMAND VALVE LEAKAGE TEST:
   30 PSIG-INITIAL READING (0.5 TO 1.8 INH_2O) _____ INH_2O
   3 MINUTE READING (INITIAL ±0.1 INH_2O) _____ INH_2O
   80 PSIG-INITIAL READING (0.5 TO 1.8 INH_2O) _____ INH_2O
   3 MINUTE READING (INITIAL ±0.1 INH_2O) _____ INH_2O

6. SAFETY PRESSURE TEST: (GROUND LEVEL)

INLET PRESSURE	FLOW LPM	FLOW INH_2O	INH_2O MINIMUM	INH_2O MAXIMUM	INH_2O READ
10 PSI	0	0	0.5	1.8	
10 PSI	75		0.5	1.8	
80 PSI	0	0	0.5	1.8	
80 PSI	240		3.0	4.0	

Figure 10-3. Performance Test Sheet Preparation (Sheet 1 of 2)

7. PRESSURE BREATHING FOR ALTITUDE (PBA) TEST:

ALT	INLET PRES.	75 LPM INH_2O	0 & 75 MIN	0 & 75 MAX	0 LPM READ	75 LPM READ	240 LPM INH_2O	240 LPM MIN	240 LPM MAX	240 LPM READ
30	10		0.5	2.5						
30	80		0.5	2.5				1.2	3.2	
34	10		0.5	4.0						
34	80		0.5	4.0				1.1	4.6	
36	10		3.0	6.0						
36	80		3.0	6.0				3.0	6.0	
45	10		13.0	16.0						
45	80		13.0	16.0				13.0	16.0	
50	10		16.0	20.0						
50	80		16.0	20.0				16.0	20.0	

8. PRESSURE BREATHING FOR Gs (PBG) TEST: (INLET PRESSURE - 80 PSIG)

ALTITUDE	FLOW LPM	FLOW INH_2O	G-SIGNAL PSI	INH_2O MINIMUM	INH_2O MAXIMUM	INH_2O READ
GROUND	0	0	3.5	0.5	4.3	
GROUND	150		3.5	1.5	5.3	
GROUND	0	0	9.5	23.5	27.8	
GROUND	150		9.5	24.5	28.8	
50,000	0	0	3.5	16.0	20.0	
50,000	150		3.5	16.0	20.0	
50,000	0	0	9.5	23.5	27.8	
50,000	150		9.5	23.5	27.8	

NOTE 1: CONVERSION BETWEEN LPM AND INH_2O VALUES MUST BE MADE USING TEST STAND CALIBRATION CHARTS.

Figure 10-3. Performance Test Sheet Preparation (Sheet 2 of 2)

10-16. The following tests require conversion of flows from actual lpm to indicated inH_2O.

1. Safety Pressure Test.

2. Pressure Breathing for Altitude (PBA) Test.

3. Pressure Breathing for Gs (PBG) Test.

10-17. REGULATOR PERFORMANCE TESTS.

10-18. SAFETY PRESSURE TEST. To convert actual liters per minute (lpm) flows to indicated inches of water (inH_2O) flows, proceed as follows:

1. Using the sea level output graph, locate the 75 lpm line on the bottom of the graph and trace the line up to where it intersects with the nitrogen line.

2. Trace the line from the point of intersection across the graph to the left-hand column to determine inH_2O equivalent.

3. Repeat steps 1 and 2 for converting the 240 lpm flow.

10-19. PRESSURE BREATHING FOR ALTITUDE (PBA) TEST. To convert actual lpm flows to indicated inH_2O flows, proceed as follows:

1. Using the 30,000 feet altitude output graph, locate the 75 lpm line on the bottom of the graph and trace the line up to where it intersects with the nitrogen line.

2. Trace the line from the point of intersection across the graph to the left-hand column to determine inH_2O equivalent.

3. Repeat steps 1 and 2 for converting the 240 lpm flow.

4. Repeat steps 1, 2 and 3 using the 34,000, 36,000, 45,000, and 50,000 feet altitude output graphs.

10-20. PRESSURE BREATHING FOR GS (PBG) TEST. To convert actual lpm flows to indicated inH_2O flows, proceed as follows:

1. Using the sea level output graph, locate the 150 lpm line on the bottom of the graph and trace the line up to where it intersects the nitrogen line.

2. Trace the line from the point of intersection across the graph to the left-hand column to determine inH_2O equivalent.

3. Repeat steps 1 and 2 using the 50,000 feet altitude output graph.

Section 10-4. Maintenance

10-21. GENERAL.

10-22. This section contains the procedural steps for inspecting, testing, troubleshooting, disassembly, cleaning, assembly and adjusting the Demand Oxygen Regulator, Type CRU-103/P.

NOTE

The regulator will be considered beyond economical repair when the cost of the parts exceeds approximately 75% of the cost of the regulator.

Document all special inspections by making the necessary entries on the appropriate forms in accordance with OPNAVINST 4790.2 Series.

All maintenance actions shall be documented by making the necessary entries on the appropriate forms in accordance with OPNAVINST 4790.2 Series.

10-23. The Demand Oxygen Regulator, Type CRU-103/P, shall be maintained at the lowest level of maintenance authorized to perform the maintenance functions. The preflight inspection is conducted at Organizational Level maintenance by the aircrewmembers to verify operation of the regulator and demand breathing output pressure. Repairs and testing shall be performed at the Intermediate Level maintenance. The regulator shall remain in service for as long as it continues to function correctly and does not require excessive repair.

10-24. Procedural steps outlined in this section are listed under the inspection cycle in which they are required and are further listed in the sequence in which they normally occur.

10-25. INSPECTION.

10-26. DAILY/PREFLIGHT INSPECTION. The Daily/Preflight Inspection is a Visual Inspection performed by the aircrewmember to whom the regulator is issued, daily or prior to each flight. To perform the inspection, visually inspect the following:

WARNING

When working with oxygen, make certain that clothing, tubing fittings and equipment are free of oil, grease, fuel, hydraulic fluid or any combustible material. Fire or explosion can result when even slight traces of combustible material come in contact with oxygen under pressure.

1. Inlet and outlet connections for security of attachment.

2. Regulator body for bends, dents, scratches, corrosion, condition of nameplate, cracks or any other damage.

3. Perform a Functional Test in accordance with paragraph 10-28.

10-27. If discrepancies are found or suspected, the defective regulator shall be removed and a Ready-For-Issue (RFI) regulator installed. The defective regulator shall be taken to the Aviator's Equipment Branch for the required corrective maintenance action.

10-28. SPECIAL 30-DAY INSPECTIONS. Special inspections are required at specified intervals other than Daily/Preflight Inspections. The intervals for the Demand Oxygen Regulator, Type CRU-103/P, Special Inspection is 30 days. This Special 30-Day Inspection consists of a Visual Inspection and a Functional Test, both performed by personnel of the Aviator's Equipment Branch. To perform the Special 30-Day Inspection, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen, Type 1	MIL-O-27210

1. Visually inspect the regulator in accordance with paragraph 10-30.

WARNING

When working with oxygen, make certain that clothing, tubing fittings and equipment are free of oil, grease, fuel, hydraulic fluid or any combustible material. Fire or explosion can result when even slight traces of combustible material come in contact with oxygen under pressure.

2. Functionally test the regulator by attaching the oxygen mask, regulator, and hose assembly to an oxygen supply source which conforms with Aviators Breathing Oxygen.

3. Turn supply source on. There should be a flow of oxygen through the mask.

NOTE

Resistance during exhalation is due to the positive pressure feature of the regulator.

4. Don mask and breathe. There should be a slight resistance on exhalation and no mechanical noise or vibration from the regulator.

5. Upon completion of the Special 30-Day Inspection, make the necessary entries on the appropriate forms in accordance with OPNAVINST 4790.2 Series.

10-29. SPECIAL 90-DAY INSPECTION. The Special 90-Day Inspection shall be performed on all Demand Oxygen Regulators, Type CRU-103/P upon issue prior to being installed in an in-service personal oxygen configuration, and shall be performed on all demand oxygen regulators in service at least every 90 days. Regulators in service require removal from the aircraft to perform this special inspection. The Special 90-Day Inspection consists of a Visual Inspection and a Bench Test. All work shall be performed in a clean, dust-free and oil-free area.

10-30. Visual Inspection. To perform a Visual Inspection of the regulator, proceed as follows:

1. Disconnect communications connections.

2. Disconnect mask delivery hose from regulator mask outlet.

3. Disconnect vest hose from regulator vest outlet.

4. Disconnect inlet supply hose from regulator breathing gas inlet.

5. Disconnect anti-g hose from regulator anti-g ref pressure inlet.

6. Inspect regulator inlets and outlets for foreign objects, dirt, corrosion, bends, dents, cracks, and other damage. Ensure regulator breathing gas inlet filter is properly installed.

7. Inspect regulator body for bends, dents, cracks, corrosion, condition of nameplate, security of screws, and fittings for other obvious damage.

NOTE

If personnel mounting pins are loose, missing, or damaged in any way, do not BCM the CRU-103 Oxygen Regulator. Submit Hazardous Material Report (HMR) to Aviation Oxygen Fleet Support Team, Naval Air Warfare Center Aircraft Division, Patuxent River, MD. Attention Code 4.6.3.2. requesting Engineering Investigation. No FST response required. Ship regulator with defective mounting pins to the following address for repair: Commander, Naval Air Warfare Center-Aircraft Division, ATTN: Code 4.6.3.2, 48110 Shaw Rd Unit 5, Patuxent River, MD 20670-1906.

CRU-103/P Oxygen Regulators that are used with protective pocket manufactured in accordance with Aircrew Systems Change No. 598 Revision A, instead of the mounting bracket, do not require mounting pins and are not required to have an HMR submitted to the Aviation Oxygen Fleet Support Team. These regulators can be bench tested and returned to service.

8. Inspect personnel mounting pins for security of attachment and good condition.

9. Inspect PBG inlet fitting for damage and security of attachment. Repair as necessary in accordance with paragraph 10-62.

10. Upon completion of the Special 90 Day Inspection, make the necessary entries on the appropriate forms in accordance with OPNAVINST 4790.2 Series.

10-31. Regulators failing the Visual Inspection or the Bench Test (paragraph 10-32) shall be repaired, if specified repair is authorized. SM&R Codes define repairable components and level of maintenance authorized for repair. Further explanation is contained in the Naval Aviation Maintenance Program Manual, OPNAVINST 4790.2 Series.

10-32. BENCH TEST.

WARNING

Because of possible vacuum pump explosion, only water-pumped nitrogen, Type 1, Class 1, Grade A (Fed Spec BB-N-411) shall be used for testing Demand Oxygen Regulators.

For oxygen test stands and purging equipment, use only nitrogen from gray cylinders marked NITROGEN OIL FREE in white letters. Two 3-inch wide black bands mark the tops of these cylinders.

3500 psig water-pumped, oil-free, gaseous nitrogen cylinders are normally components of aircraft servicing carts. The possibility exists that these cylinders may be contaminated. Do not use these cylinders.

10-33. The Bench Test shall be performed using an Oxygen System Components Test Stand, Model 1172AS100 or 1316AS100. Refer to appropriate Ground Support Equipment Manual for identification of test stand controls and indicators referred to in the Bench Test procedures that follow. Do not attempt to perform any Bench Test before becoming thoroughly familiar with the test stand. Utilize Performance Test Sheet, (figure 10-3) when performing Bench Test.

CAUTION

Many of the regulator components have lapped surfaces. To maintain proper performance, these parts should be handled using plastic tweezers to avoid scratches, nicks, or contamination from technician's hands.

NOTE

Refer to figure 10-4 for index number identification of special tools and test equipment used to Bench Test the Type CRU-103/P regulator and referenced in each test description. Figure 10-5 identifies hose assembly interface with test stand altitude chamber.

The following Bench Test procedures are arranged to proceed from one test to another with minimal change in test set up and valve positioning.

10-34. CLEANING AND LUBRICATION OF PREFORMED PACKINGS. To clean and lubricate preformed packings, proceed as follows:

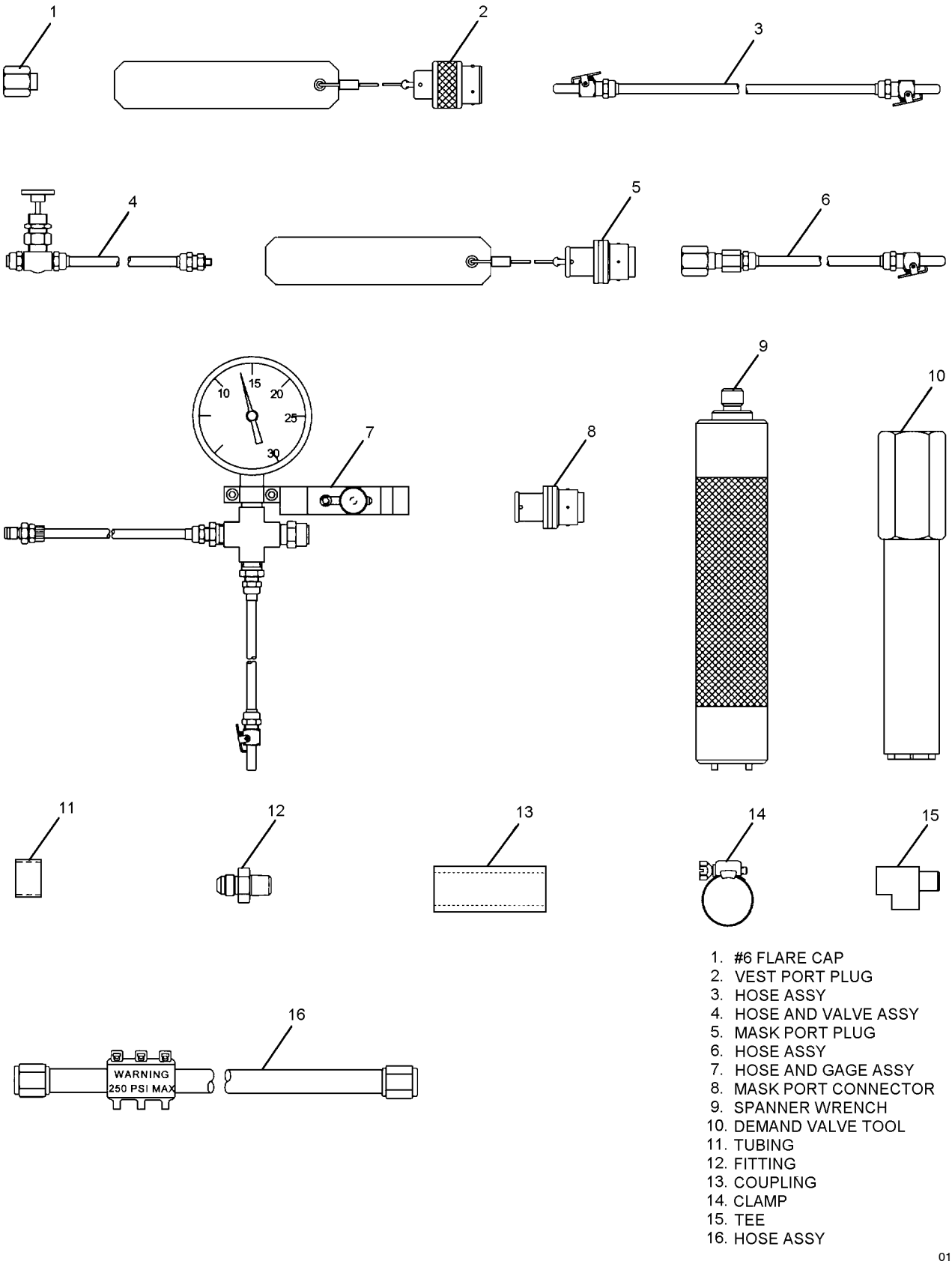


Figure 10-4. Special Tools and Test Equipment

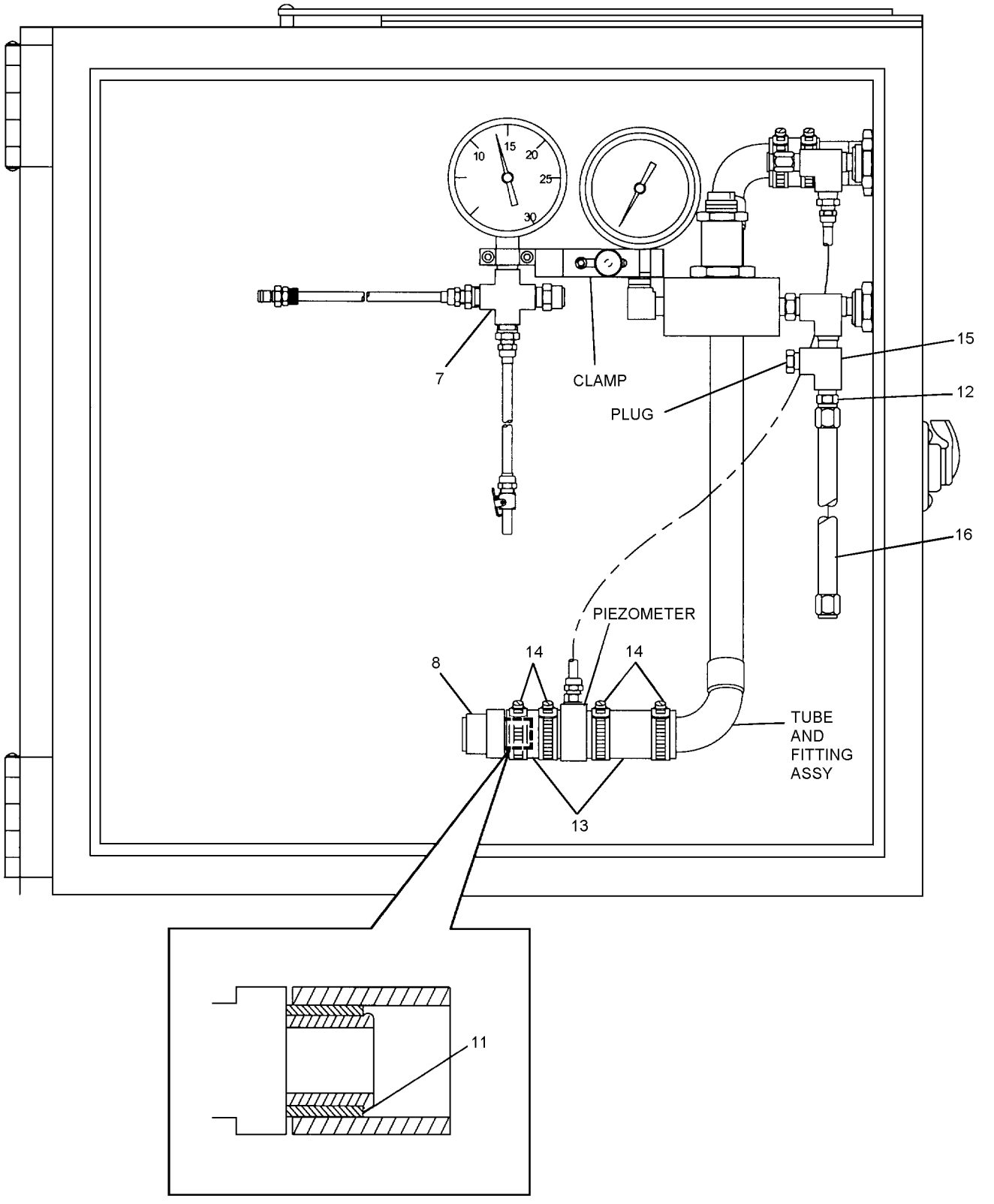


Figure 10-5. Test Stand Altitude Chamber Bench Test Arrangement

NOTE

Refer to figure 10-17 for identification of components referenced by index numbers in this procedure.

It will not be necessary to replace vest connector subsystem component parts during this cleaning and lubrication function.

1. Disassemble vest connector subsystem in accordance with paragraph 10-53.

2. Clean and lubricate two preformed packing (53) in accordance with paragraphs 10-55, 10-56, and 10-59.

3. Assemble vest connector subsystem in accordance with paragraph 10-67.

WARNING

Ensure altitude chamber is configured in accordance with NAVAIR 17-15BC-21, WP003 00, Figure 3, sheets 2 thru 4 as applicable. Ensure High Pressure or Low Pressure Hose Assembly listed in NAVAIR 17-15BC-21, WP031 00, Figure 1 or Figure 2 is attached to N_2 Input Connection (18) or Tee Connection (28) in altitude chamber as applicable for the oxygen regulator being tested. Remove hose assembly not being used and cap connection (18) or (28) when not in use. For regulators requiring inlet pressures greater than 175 psig, the High Pressure Hose Assembly in NAVAIR 17-15BC-21, WP031 00, Figure 1 shall be used.

10-35. MAIN RELIEF VALVE OVERLOAD TEST (LOW PRESSURE). To perform the Main Relief Valve Overload Test (Low Pressure), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

Ensure regulator outlet and Piezometer (26) are a maximum one inch apart.

In order to read the new PRESS./SUCTION Manometer (4) digital gage, it will be necessary to turn on the test vacuum pump. Vacuum pump shall remain on for all tests during Bench Test.

For Bench Testing, the CRU-103/P Regulator must be configured for OBOGS application using oxygen inlet fitting, P/N F395-1106-1 to eliminate the possibility of false indication of malfunction.

1. Cap regulator breathing gas inlet with cap (1) and tighten with a 11/16-inch wrench.

2. Plug regulator vest outlet with vest port plug (2).

3. Use Hose Assembly (3) to connect LOW PRESS. Connection (19) to REF TAP Connection (21) in the altitude chamber.

4. Install regulator mask outlet on mask connector (8).

5. Ensure all test stand valves are secured.

6. Turn on supply cylinder valve.

7. Set LEAKAGE Valve (F) to HIGH position.

8. Set FLOW SELECTOR Valve (M) to REGULATOR.

9. Slowly set PRESS. SELECTOR Valve (D) to H_2O position.

10. Slowly open LOW PRESS. REGULATOR (N) until REGULATED LOW PRESS. gage (11) indicates 70 psig.

11. Slowly open and stabilize LEAKAGE CONTROL Valve (E) until High Range LEAKAGE ROTAMETER (8) indicates 2000 ccm.

12. Observe PRESS./SUCTION Manometer (4). The regulator shall begin to relieve pressure at 3.8 inH_2O minimum, 10 inH_2O maximum. Record results on Performance Test Sheet.

13. Close Leakage Control Valve (E).

14. Disconnect Hose Assembly (3) from LOW PRESS. Connection (19) and REF TAP Connection (21).

15. Disconnect regulator from mask connector (8).

16. Remove cap (1) and vest port plug (2) from regulator breathing gas inlet and vest outlet.

17. If malfunction occurs, locate probable cause using troubleshooting chart, table 10-2.

Table 10-2. Troubleshooting Main Relief Valve Overload Test (Low Pressure)

Trouble	Probable Cause	Remedy
Main relief valve vents at less than 3.8 inH_2O.	Adjustment setscrew (41, figure 10-17) out of adjustment.	Remove relief valve subsystem. Turn adjustment screw clockwise in half turn increments. Install relief valve subsystem and retest.
	Faulty main relief valve subsystem.	Replace main relief valve subsystem using parts kit P/N F417-1016-3.
Main relief valve vents at less than 3.0 inH_2O.	Diaphragm (26, figure 10-17) damaged or improperly installed.	Replace or reseat diaphragm (26, figure 10-17).
Main relief valve vents at a pressure greater than 10.0 inH_2O.	Adjustment setscrew (41, figure 10-17) out of adjustment.	Remove relief valve subsystem. Turn adjustment setscrew counterclockwise in half-turn increments to lower readings until they are within range. Install relief valve subsystem and retest.

10-36. VEST RELIEF VALVE OVERLOAD TEST. To perform the Vest Relief Valve Overload Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove ring (10) and screen (7) from regulator bleed port.

2. Connect hose assembly (4) to the regulator bleed port. Fully open hose assembly (4) flow control valve (full counterclockwise).

CAUTION

Be careful not to block the outlet of hose assembly (4) flow control valve.

3. Use hose assembly (6) to connect regulator breathing gas inlet to chamber LOW PRESS. Connection (19).

4. Install regulator on mask port connector (8).

5. Ensure all test stand valves are secured.

6. Set PRESS. SELECTOR Valve (D) to H_2O position.

7. Fully open LEAKAGE CONTROL Valve (E).

8. Adjust LOW PRESS. REGULATOR (N) until REGULATED LOW PRESS. gage (11) indicates 70 psig.

NOTE

Slowly close and open hose assembly (4) flow control valve to exercise vest relief valve prior to performing step 9.

9. Observe High Range LEAKAGE ROTAMETER (8). Record initial design bleed on Performance Test Sheet.

10. Observe PRESS./SUCTION Manometer (4). Record initial safety pressure on Performance Test Sheet.

11. Slowly close hose assembly (4) flow control valve (clockwise) while observing PRESS./SUCTION Manometer (4).

12. Observe PRESS./SUCTION Manometer (4). The regulator shall begin to relieve outlet pressure at 20 inH_2O minimum, 24 inH_2O maximum. Record results on Performance Test Sheet.

13. Slowly, fully open hose assembly (4) flow control valve (counterclockwise).

14. Observe High Range LEAKAGE ROTAMETER (8). Final design bleed must be within ± 100 ccm of initial design bleed. Record final design bleed on Performance Test Sheet.

15. Observe PRESS./SUCTION Manometer (4). Final safety pressure must be within ± 0.5 inH_2O of initial safety pressure. Record final safety pressure on Performance Test Sheet.

NOTE

An in-tolerance condition per steps 14 and 15 indicates that the vest relief valve is reseating properly.

16. If malfunction occurs, locate the probable cause and remedy using troubleshooting chart, table 10-3.

10-37. MAIN RELIEF VALVE OVERLOAD TEST (HIGH PRESSURE). To perform Main Relief Valve Overload Test (High Pressure), proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Cap regulator vest outlet with vest port plug (2).

2. Set PRESS. SELECTOR Valve (D) to H_2O position.

3. Adjust LOW PRESS. REGULATOR (N) until REGULATED LOW PRESS. gage (11) indicates 70 psig.

NOTE

Slowly close and open hose assembly (4) flow control valve to exercise main relief valve prior to performing step 4.

4. Observe High Range LEAKAGE ROTAMETER (8). Record initial design bleed on Performance Test Sheet.

5. Observe PRESS./SUCTION Manometer (4). Record initial safety pressure on Performance Test Sheet.

6. Slowly close hose assembly (4) flow control valve (clockwise) while observing PRESS./SUCTION Manometer (4).

Table 10-3. Troubleshooting (Vest Relief Valve Overload Test)

Trouble	Probable Cause	Remedy
Vest relief valve vents at less than 20 inH_2O.	Defective vest relief valve.	Replace vest relief valve using vest connector subsystem parts kit P/N F417-1015-3.
Vest relief valve vents at greater than 24 inH_2O.	Defective vest relief valve.	Replace vest relief valve using vest connector subsystem parts kit P/N F417-1015-3.
Vest relief valve out of tolerance per steps 15 or 16.	Defective vest relief valve.	Replace vest relief valve using vest connector subsystem parts kit P/N F417-1015-3.
PRESS./SUCTION Manometer (4) creeps slowly when design bleed port is closed.	Demand valve contaminated or preformed packing (36, figure 10-17) needs lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.

7. Observe PRESS./SUCTION Manometer (4). The regulator shall begin to relieve outlet pressure at 30 inH_2O minimum, 36 inH_2O maximum. Record results on Performance Test Sheet.

8. Slowly, fully open hose assembly (4) flow control valve (counterclockwise).

NOTE

An in tolerance condition per steps 9 and 10 indicates that the main relief valve is reseating properly.

9. Observe High Range LEAKAGE ROTAMETER (8). Final design bleed must be within ±100 ccm of initial design bleed. Record final design bleed on Performance Test Sheet.

10. Observe PRESS./SUCTION Manometer (4). Final safety pressure must be within ±0.5 inH_2O of initial safety pressure. Record final safety pressure on Performance Test Sheet.

11. Close LEAKAGE CONTROL Valve (E).

12. Disconnect regulator outlet from Piezometer (26).

CAUTION

Ensure LEAKAGE CONTROL Valve (E) is fully closed prior to performing step 13. Damage to test stand could occur.

13. Disconnect hose assembly (6) from LOW PRESS. Connection (19) and regulator inlet.

14. Disconnect hose assembly (4) from regulator bleed port.

15. Remove vest port plug (2) from vest outlet port.

16. Install screen (7, figure 10-17) and ring (10, figure 10-17) on regulator bleed port.

17. If malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-4.

Table 10-4. Troubleshooting (Main Relief Valve Overload Test)

Trouble	Probable Cause	Remedy
Main relief valve vents at less than 30 inH_2O.	Valve out of adjustment.	Refer to figure 10-2. Turn main relief valve adjustment screw clockwise in 1/4 turn increments and retest.
Main relief valve vents at greater than 36 inH_2O.	Valve out of adjustment.	Refer to figure 10-2. Turn main relief valve adjustment screw counterclockwise in 1/4 turn increments and retest.
Main relief valve out of tolerance per step 9 or 10.	Seat leakage.	Replace main relief valve subsystem using parts kit P/N F417-1016-3.
PRESS./SUCTION Manometer (4) creeps slowly when design bleed is closed.	Demand valve contaminated or preformed packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.

10-38. OVERALL LEAKAGE TEST. To perform the Overall Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Cap the regulator mask outlet with mask port plug (5).

2. Use hose assembly (16) to connect regulator breathing gas inlet to N_2 INPUT Connection (18).

3. Ensure all test stand valves are secured.

4. Turn INLET PRESS. Valve (L) to ON.

5. Adjust LOW PRESS. REGULATOR (N) until N_2 INPUT PRESS. gage (27) indicates 70 psig.

6. Turn LEAKAGE Valve (G) to ON.

7. Turn INLET PRESS. Valve (L) to OFF.

8. Observe High Range LEAKAGE ROTAMETER (8). Maximum allowable overall leakage is 900 ccm. Record results on Performance Test Sheet.

9. Turn LEAKAGE Valve (G) to OFF.

10. If malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-5.

Table 10-5. Troubleshooting (Overall Leakage Test)

Trouble	Probable Cause	Remedy
Regulator overall leakage is greater than 900 ccm.	Damaged breathing diaphragm (26, figure 10-17).	Replace diaphragm using demand valve subsystem parts kit P/N F417-1017-3.
	Excessive demand valve leakage.	Repair demand valve subsystem using parts kit P/N F417-1017-3.
	Leakage from inlet fitting (45) packing.	Replace packing using inlet fitting subsystem parts kit P/N F417-1014-3.
	Leakage from mask port packing.	Replace packing using inlet fitting subsystem parts kit P/N F417-1014-3.

10-39. DEMAND VALVE LEAKAGE TEST. To perform the Demand Valve Leakage Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	62-A-116-E1 or 1172AS100 or 1316AS100
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove mask port plug (5) from regulator mask outlet. Connect regulator mask outlet to mask port connector (8).

2. Slowly set PRESS. SELECTOR Valve (D) to H_2O position.

3. Turn INLET PRESS. Valve (L) to ON.

4. Adjust LOW PRESS. REGULATOR (N) until N_2 INPUT PRESS. gage (27) indicates 30 psig.

5. Turn vacuum pump to ON.

6. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 1.8 inH_2O. Record results on Performance Test Sheet.

7. Maintain pressure for a period of 3 minutes. After 3 minutes, the outlet pressure shall be within ±0.1 inH_2O of the outlet pressure recorded per step 6. Record results on Performance Test Sheet.

8. Slowly adjust LOW PRESS. REGULATOR (N) until N_2 INPUT PRESS. gage (27) indicates 80 psig.

9. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 1.8 inH_2O. Record results on Performance Test Sheet.

10. Maintain pressure for a period of 3 minutes. After 3 minutes, the outlet pressure shall be within ±0.1 of the outlet pressure recorded per step 9. Record results on Performance Test Sheet.

11. If a malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-6.

10-40. SAFETY PRESSURE TEST. To perform the Safety Pressure Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Cap regulator vest outlet with vest port plug (2).

2. Adjust LOW PRESS. REGULATOR (N) until 10 psig is indicated on N_2 INPUT PRESS. Gage (27).

3. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 1.8 inH_2O. Record results on Performance Test Sheet.

NOTE

Ensure inlet pressure is maintained when applying specified flow.

4. Slowly open and adjust OUTPUT Flow Control Valve (C) until the equivalent of 75 lpm is observed on OUTPUT FLOW Manometer (1).

5. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at 75 lpm flow shall be between 0.5 and 1.8 inH_2O. Record results on Performance Test Sheet.

6. Close OUTPUT Flow Control Valve (C).

7. Adjust LOW PRESS. REGULATOR (N) until 80 psig is indicated on N_2 INPUT PRESS. Gage (27).

8. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 1.8 inH_2O. Record results on Performance Test Sheet.

NOTE

Adjust LOW PRESS. REGULATOR (N) as required to maintain 80 psig on N_2 INPUT PRESS. Gage (27).

9. Slowly open and adjust OUTPUT Flow Control Valve (C) until the inH_2O equivalent of 240 lpm is observed on OUTPUT FLOW Manometer (1).

10. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at 240 lpm flow shall be between 3.0 and 4.0 inH_2O. Record results on Performance Test Sheet.

11. Close OUTPUT Flow Control Valve (C).

12. If a malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-7.

10-41. PRESSURE BREATHING FOR ALTITUDE (PBA) TEST. Proceed with the Pressure Breathing for Altitude Test as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100

Table 10-6. Troubleshooting (Demand Valve Leakage Test)

Trouble	Probable Cause	Remedy
Demand valve outlet pressure at 30 or 80 psig and zero flow is less than 0.5 inH_2O.	Demand valve out of adjustment.	Refer to figure 10-2. Turn demand valve seat adjustment counterclockwise in 1/8 turn increments and retest.
Demand valve outlet pressure at 30 or 80 psig and zero flow is greater than 1.8 inH_2O.	Demand valve out of adjustment.	Turn demand valve seat adjustment clockwise in 1/8 turn increments and retest.
After 3 minutes demand valve outlet pressure at 30 or 80 psig is not within $\pm$0.1 inH_2O.	Contamination or demand valve packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.

Table 10-7. Troubleshooting (Safety Pressure Test)

Trouble	Probable Cause	Remedy
Safety pressure at 10 psig and zero flow or 75 lpm is less than 0.5 inH_2O.	Contamination or demand valve packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.
Safety pressure at 10 psig and zero flow or 75 lpm is greater than 1.8 inH_2O.	Contamination or demand valve packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.
Safety pressure at 80 psig and zero flow is less than 0.5 inH_2O.	Contamination or demand valve packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.
Safety pressure at 80 psig and zero flow is greater than 1.8 inH_2O.	Contamination or demand valve packing (36, figure 10-17) requires lubrication.	Repair demand valve subsystem using parts kit P/N F417-1017-3.
Safety pressure at 80 psig and 240 lpm is less than 3.0 inH_2O.	Screen (28, figure 10-17) is not causing enough back pressure.	Refer to figure 10-6 - remove ring (29, figure 10-17) and rotate screen (28, figure 10-17) ten degrees - install ring (29, figure 10-17) and retest - repeat as required.
Safety pressure at 80 psig and 240 lpm is greater than 4.0 inH_2O.	Screen (28, Figure 10-17) is causing too much back pressure.	

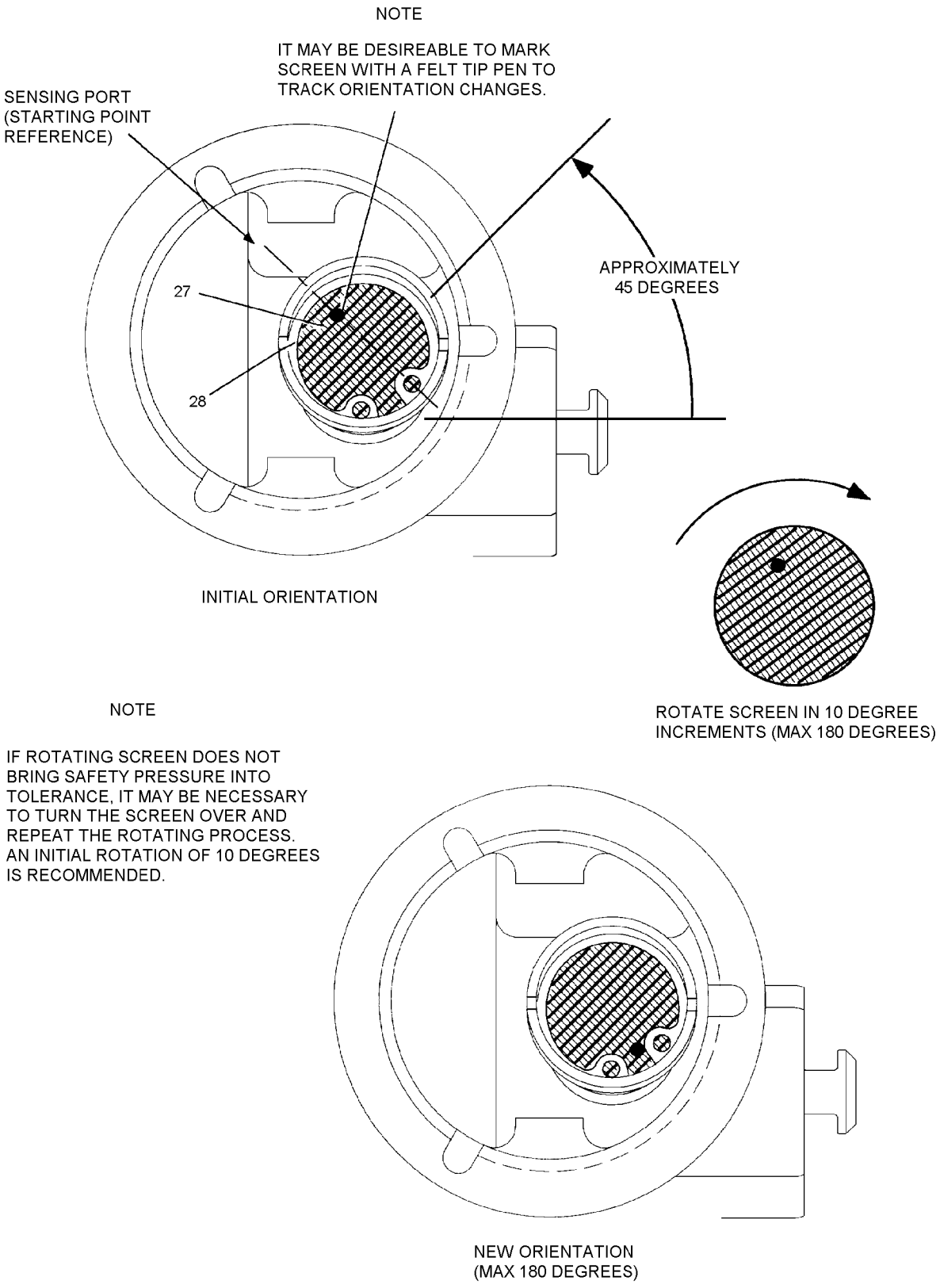


Figure 10-6. Screen Adjustment

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Close altitude chamber door.

NOTE

When ascending to test altitudes, maintain a flow of 3 inH_2O as indicated on OUTPUT FLOW MANOMETER (1).

2. Turn vacuum pump on. Open and adjust OUTPUT Flow Control Valve (C) until 3 inH_2O is observed on OUTPUT FLOW Manometer (1).

3. Observe LOW RANGE ALTM (13) and adjust VACUUM CONTROL Valve (B) to ascend to 30,000 feet.

4. Adjust LOW PRESS. REGULATOR (N) and SYSTEM BLEED Valve (S) until 10 psig is indicated on N_2 INPUT PRESS. Gage (27).

5. Close OUTPUT Flow Control Valve (C). Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 2.5 inH_2O. Record results on Performance Test Sheet.

NOTE

Ensure inlet pressure is maintained when applying specified flows.

6. Slowly open and adjust OUTPUT Flow Control Valve (C) until the inches of water equivalent of 75 lpm is observed on OUTPUT FLOW Manometer (1).

7. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at 75 lpm flow shall be between 0.5 and 2.5 inH_2O. Record results on Performance Test Sheet.

8. Close OUTPUT Flow Control Valve (C).

9. Adjust LOW PRESS. REGULATOR (N) until 80 psig is indicated on N_2 INPUT PRESS. Gage (27).

10. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between 0.5 and 2.5 inH_2O. Record results on Performance Test Sheet.

11. Slowly open and adjust OUTPUT Flow Control Valve (C) until the inH_2O equivalent of 240 lpm is observed on OUTPUT FLOW Manometer (1).

NOTE

Adjust LOW PRESS. REGULATOR (N) as required to maintain 80 psig on N_2 INPUT PRESS. Gage (27).

12. Observe PRESS. SUCTION Manometer (4). Breathing gas outlet pressure at 240 lpm flow shall be between 1.2 and 3.2 inH_2O. Record results on Performance Test Sheet.

13. Close OUTPUT Flow Control Valve (C).

14. Repeat steps 2 thru 13 at altitudes of 34,000, 36,000, 45,000, and 50,000 feet. Record readings on Performance Test Sheet.

15. When testing has been completed, close VACUUM CONTROL Valve (B).

16. Adjust OUTPUT Flow Control Valve (C) until 1 inH_2O is indicated on OUTPUT FLOW Manometer (1).

17. Adjust LOW PRESS. REGULATOR (N) until 50 psig indicated on REGULATED LOW PRESS. Gage (11).

18. Open CHAMBER BLEED Valve (K) to vent altitude chamber to ambient. Open chamber door.

19. Close OUTPUT Flow Control Valve (C).

CAUTION

Prior to performing the next test, insert one end of hose assembly (3) with two QD fittings into LOW PRESS. CONNECTION (19) to vent any trapped pressure between (19) and LEAKAGE CONTROL Valve (E). Trapped pressure could damage hose and gage assembly (7). Disconnect hose.

20. If a malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-8.

10-42. PRESSURE BREATHING FOR GS (PBG) TEST. To perform the Pressure Breathing for gs (PBG) Test, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
1	Oxygen Systems Components Test Stand	1172AS100 or 1316AS100
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Connect one hose from gage assembly (7) to chamber LOW PRESS. Connection (19).

2. Connect the other hose from gage assembly (7) to the regulator anti-g ref. port.

3. Set PRESS. SELECTOR Valve (D) to H_2O position.

4. Adjust LOW PRESS. REGULATOR (N) until 80 psig is indicated on N_2 INPUT PRESS. gage (27).

5. Slowly adjust LEAKAGE CONTROL Valve (E) until 3.5 psig is indicated on hose and gage assembly (7).

Table 10-8. Troubleshooting (Pressure Breathing for Altitude Test)

Note: For readings out of tolerance at 30,000 feet refer to table 10-7.

Trouble	Probable Cause	Remedy
PBA is less than minimum value specified at 10 psig (zero flow and 75 lpm) at all altitudes.	PBA aneroid (2, figure 10-17) is out of adjustment.	Turn PBA adjustment screw clockwise in very small increments and retest.
PBA is greater than maximum value specified at 10 psig (zero flow and 75 lpm) at all altitudes.	PBA aneroid (2, figure 10-17) is out of adjustment.	Turn PBA adjustment screw counterclockwise in very small increments and retest.
	PBA aneroid (2, figure 10-17) is leaking.	Repair PBA subsystem using parts kit P/N F417-1011-3.
PBA is less than minimum value specified at 80 psig (zero flow and 240 lpm) at all altitudes.	PBA aneroid (2, figure 10-17) is out of adjustment.	Turn PBA adjustment screw clockwise in very small increments and retest.
PBA is greater than maximum value specified at 80 psig (zero flow and 240 lpm) at all altitudes.	PBA aneroid (2, figure 10-17) is out of adjustment.	Turn PBA adjustment screw counterclockwise in very small increments and retest.
	PBA aneroid (2, figure 10-17) is leaking.	Repair PBA subsystem using parts kit P/N F417-1011-3.

6. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between the inH_2O minimum and maximum shown on the Performance Test Sheet (figure 10-3). Record results on Performance Test Sheet.

NOTE

Ensure inlet pressure is maintained on N_2 INPUT PRESS. gage (27) and hose and gage assembly (7) pressure gage when setting high flow rates with OUTPUT Flow Control Valve (C).

7. Slowly open and adjust OUTPUT Flow Control Valve (C) until the inches of water equivalent of 150 lpm is observed on OUTPUT FLOW Manometer (1).

8. Slowly adjust inlet pressure using LOW PRESS. REGULATOR (N) and LEAKAGE CONTROL Valve (E) to maintain 80 psig on N_2 INPUT PRESS. gage (27) and 3.5 psig on hose assembly pressure gage.

9. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at 150 lpm flow shall be between the inH_2O minimum and maximum shown on the Performance Test Sheet. Record results on Performance Test Sheet.

10. Close OUTPUT Flow Control Valve (C).

11. Slowly adjust inlet pressure using LOW PRESS. REGULATOR (N) and LEAKAGE CONTROL Valve (E) to maintain 80 psig on N_2 INPUT PRESS. gage (27) and 9.5 psig on hose and gage assembly (7).

12. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at zero flow shall be between the inH_2O minimum and maximum shown on the Performance Test Sheet. Record results on Performance Test Sheet.

13. Slowly open and adjust OUTPUT Flow Control Valve (C) until the inH_2O equivalent of 150 lpm is observed on OUTPUT FLOW Manometer (1).

14. Slowly adjust inlet pressure using LOW PRESS. REGULATOR (N) and LEAKAGE CONTROL Valve (E) to maintain 80 psig on N_2 INPUT PRESS. gage (27) and 9.5 psig on hose assembly pressure gage.

15. Observe PRESS./SUCTION Manometer (4). Breathing gas outlet pressure at 150 lpm flow shall be between the inH_2O minimum and maximum shown on the Performance Test Sheet. Record results on Performance Test Sheet

16. Close LEAKAGE CONTROL Valve (E).

17. Close altitude chamber door.

18. Turn vacuum pump on. Open and adjust OUTPUT Flow Control Valve (C) until 3 inH_2O is observed on OUTPUT FLOW manometer (1).

19. Observe LOW RANGE ALTM (13) and adjust VACUUM CONTROL Valve (B) to ascend to 50,000 feet.

20. Repeat steps 5 thru 16 at altitude using the tolerances specified on the Performance Test Sheet.

21. When testing has been completed, close LEAKAGE CONTROL Valve (E).

22. Adjust OUTPUT Flow Control Valve (C) until 1 inH_2O is observed on OUTPUT FLOW manometer (1).

23. Open CHAMBER BLEED Valve (K) to vent altitude chamber to ambient.

24. Close OUTPUT Flow Control Valve (C).

25. Turn off vacuum pump.

26. Set INLET PRESS. Valve (L) to OFF.

27. Back LOW PRESS. REGULATOR (N) out counterclockwise.

28. Open and close SYSTEM BLEED Valve (S) to vent any trapped pressure.

29. Open altitude chamber door and disconnect regulator from test.

30. Secure test stand.

31. If a malfunction occurs, locate probable cause and remedy using troubleshooting chart, table 10-9.

10-43. PURGE OXYGEN REGULATOR. After completion of all tests, the demand oxygen regulator is purged with oxygen as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Aviator's Breathing Oxygen, Type 1	MIL-O-27210
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)

CAUTION

Oxygen Components Test Stands cannot be used for oxygen purge. These test stands use nitrogen for a test gas.

1. Connect regulator breathing gas inlet to a regulated source of aviator's breathing oxygen.

CAUTION

Never block the outlet of the regulator while a pressure is applied to the inlet. This will seriously damage the regulator. The anti-g ref pressure inlet and the vest outlet connection shall also be uncapped during the oxygen purge.

2. Apply 90 psig to regulator inlet; allow oxygen to flow for a period of 1 to 3 minutes.

Table 10-9. Troubleshooting (Pressure Breathing for Gs Test)

Trouble	Probable Cause	Remedy
PBG is less than minimum value specified at ground level or 50,000 ft with an inlet pressure of 80 psig and a 3.5 psig g-signal.	PBG bellows (22, figure 10-17) is out of adjustment.	Refer to figure 10-2. Turn PBG adjustment screw clockwise in very small increments and retest.
	PBG bellows (22, figure 10-17) is leaking.	Repair PBG subsystem using parts kit P/N F417-1012-3.
	G-sensing inlet fitting (43, figure 10-17) packing is leaking.	Repair g-sensing inlet subsystem using parts kit P/N F417-1013-3.
PBG is greater than maximum value specified at ground level or 50,000 ft with an inlet pressure of 80 psig and a 3.5 psig g-signal.	PBG bellows (22, figure 10-17) is out of adjustment.	Refer to figure 10-2. Turn PBG adjustment screw counterclockwise in very small increments and retest.
PBG is less than minimum value specified at ground level or 50,000 ft with an inlet pressure of 80 psig and a 9.5 psig g-signal.	PBG bellows (22, figure 10-17) is out of adjustment.	Turn PBG adjustment screw clockwise in very small increments and retest.
	PBG bellows (22, figure 10-17) is leaking.	Repair PBG subsystem using parts kit P/N F417-1012-3.
	G-sensing inlet fitting (43, figure 10-17) is leaking.	Repair g-sensing inlet subsystem using parts kit P/N F417-1013-3.
PBG is greater than maximum value specified at ground level or 50,000 ft with an inlet pressure of 80 psig and a 9.5 psig g-signal.	PBG bellows (22, figure 10-17) is out of adjustment.	Turn PBG adjustment screw counterclockwise in very small increments and retest.

3. Shut off oxygen source and disconnect regulator.

NOTE

All equipment forwarded from the Organizational Level maintenance to the Intermediate Level maintenance shall be accompanied by the appropriate forms in accordance with OPNAVINST 4790.2 Series. The test stand operator and CDI shall sign the Performance Test Sheet, and the original or a copy shall be forwarded to the organizational custodian. Upon completion of the Bench Test or special inspection, the organizational custodian shall retain the Aircrew Systems Record, Performance Test Sheet and VIDS/MAF.

4. Affix serviceable condition label with CDI stamp and date to regulator.

5. After completion of oxygen purge, place regulator in a plastic bag for storage.

10-44. DISASSEMBLY.

10-45. Disassemble the demand oxygen regulator using figure 10-17 as a guide for identifying parts. Do not remove the identification plate unless replacement is necessary. Special instructions for disassembling the regulator are contained in the following paragraphs.

10-46. The regulator is broken down into seven subsystems as follows:

1. PBA Subsystem
2. PBG Subsystem
3. Demand Valve Subsystem
4. G-sensing Inlet Subsystem
5. Inlet Fitting/Filter Subsystem
6. Vest Connector Subsystem
7. Main Relief Valve Subsystem

10-47. Only the regulator subsystems which require maintenance are to be disassembled and repaired as required. Parts kits to support each subsystem are listed in Section 10-5, Illustrated Parts Breakdown. Upon completion of any subsystem maintenance, the entire Bench Test must be completed prior to returning the regulator to service.

CAUTION

All disassembly, inspection, repair, and assembly must be done on benches having good lighting and in an area provided with air conditioning or air filtering. Walls, floor and ceiling should have a smooth finish, and be painted with non-chalking paint which can be kept clean and dust-free. It is desirable to keep all parts for each individual regulator separated. Plastic partitioned boxes with covers or similar storage facilities should be used to keep the parts segregated and protected from dirt and moisture. Plastic bags are also useful for storing subassemblies and component parts after cleaning and inspection until ready for assembly.

NOTE

Special tools shall be requisitioned directly from the manufacturer Carleton Technologies (CAGE 04577), or obtain commercial equivalent.

For identification of regulator components referenced by index numbers used in the following paragraphs refer to figure 10-17. Refer to figure 10-4 for index numbers used for special tools and test equipment. Damaged or worn parts removed from the regulator at disassembly must be discarded and replaced at assembly with like parts from the applicable subsystem parts kit.

10-48. PBA SUBSYSTEM. To disassemble the PBA Subsystem, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner	F395-1096-MT

1. Using spanner wrench (9, figure 10-4), disassemble PBA aneroid housing (1, figure 10-17) from PBA/PBG housing (11).

2. Remove PBA aneroid (2) from PBA aneroid housing (1).

3. Remove valve (3), spring (6), seat (4) and preformed packing (5) from PBA/PBG housing (11).

4. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild PBA subsystem using parts kit F417-1011-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59 and 10-71, respectively.

10-49. PBG SUBSYSTEM. To disassemble the PBG Subsystem, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner	F395-1096-MT
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove two filter screens (7) by removing two retaining rings (10) from PBA/PBG housing (11). Remove spring (8) and ball (9).

2. Disassemble PBA/PBG housing (11) and retainer (46) from regulator body (61) by removing four screws (12) and four washers (13). Install the threaded end of spanner wrench (9, figure 10-4) in regulator bleed port. Carefully pull PBA/PBG housing from regulator body (61). (Spring (25) may pop out).

3. Remove spanner wrench and preformed packing (14) from PBA/PBG housing (11).

CAUTION

Refer to figure 10-7. Diaphragm Cover (15) has a lapped surface, use extreme care when handling.

4. Remove diaphragm cover (15) from PBA/PBG housing (11).

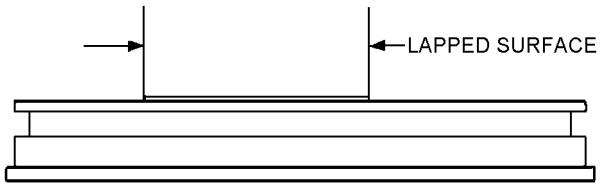
5. Remove spring (17), preformed packing (16), check valve (18), PBG valve (19), diaphragm bushing (20) and diaphragm (21).

6. Remove PBG bellows (22) from PBA/PBG housing (11).

7. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild PBG subsystem using parts kit F417-1012-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59 and 10-70, respectively.



010007

Figure 10-7. Diaphragm Cover Lapped Surface Identification

10-50. DEMAND VALVE SUBSYSTEM. To disassemble the Demand Valve Subsystem, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Tool, Demand Valve	F395-1091-MT
1	Wrench, Spanner	F395-1096-MT
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove filter screen (7) from bleed port by removing retaining ring (10) from PBA/PBG housing (11).

2. Disassemble PBA/PBG housing (11) and retainer (46) from regulator body (61) by removing four screws (12) and four washers (13). Install the threaded end of spanner wrench (9, figure 10-4) in regulator bleed port. Carefully pull PBA/PBG housing (11) from regulator body (61). (Spring (25) may pop out).

3. Remove spanner wrench and preformed packing (14) from PBA/PBG housing (11).

4. Remove spring (25) from regulator body (61).

5. Carefully disengage underside of diaphragm (26) from bell crank (39) by rotating diaphragm approximately 1/4 turn counterclockwise. Remove diaphragm (26).

6. Remove screw (27).

7. Remove filter screen (28) by removing retaining ring (29) from seat (30).

8. Using demand valve tool (10, figure 10-4), disassemble seat (30, figure 10-17) from regulator body (61) by rotating counterclockwise.

9. Remove pin (40) from bracket (42). Remove bracket (42).

10. Remove bellcrank (39) by disengaging from poppet and cable assembly (32).

11. Remove poppet and cable assy (32), spring (34), bushing (35), and spring (37).

12. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild demand valve subsystem using parts kit P/N F417-1017-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59, and 10-70, respectively.

10-51. G-SENSING INLET SUBSYSTEM. To disassemble the G-sensing Inlet Subsystem, proceed as follows:

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove g-sensing inlet fitting (43) from regulator body (61).

2. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild G-sensing Inlet Subsystem using parts kit P/N F417-1013-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59, and 10-69, respectively.

10-52. INLET FITTING/FILTER SUBSYSTEM. To disassemble the Inlet Fitting/Filter Subsystem, proceed as follows:

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove retainer (46) by removing one screw (12) and one washer (13) from regulator body (61).

CAUTION

Use extreme care when removing retaining clip (47) to prevent damage to inlet fitting (45) and regulator body (61).

2. Remove inlet fitting (45) by removing retaining clip (47) from regulator body (61).

3. Remove preformed packing (48), retaining ring (50) and filter (49).

4. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild inlet fitting/filter subsystem using parts kit P/N F417-1014-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59, and 10-68, respectively.

10-53. VEST CONNECTOR SUBSYSTEM. To disassemble the Vest Connector Subsystem, proceed as follows:

CAUTION

Housing (51) is under spring pressure. Retain housing (51) while removing screws (52).

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove two screws (52) from regulator body (61).

2. Remove housing (51) and spring (55).

3. Remove relief valve (54) from housing (51) by gently pushing from vest outlet side.

4. Remove two preformed packings (53) and seat (56).

5. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, rebuild vest connector subsystem using parts kit P/N F417-1015-3. Clean, inspect, lubricate and reassemble in accordance with paragraph 10-55, 10-57, 10-59, and 10-67, respectively.

10-54. MAIN RELIEF VALVE SUBSYSTEM. To disassemble the Main Relief Valve Subsystem, proceed as follows:

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Remove relief valve assembly (57) by removing two screws (58) and two lockwashers (59) from regulator body (61).

2. Remove preformed packing (38) from regulator outlet.

NOTE

If further disassembly is not required, replace main relief valve subsystem using parts kit P/N F417-1016-3. Clean, inspect, lubricate and reassemble in accordance with paragraphs 10-55, 10-57, 10-59, and 10-66, respectively.

10-55. CLEANING OF DISASSEMBLED PARTS.

10-56. To clean the disassembled oxygen regulator components, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Bag, Plastic	MIL-B-117 (CAGE 81349)
As Required	Nitrogen, Oil-free, Water Pumped, Type I, Class I, Grade B	Fed Spec BB-N-411 NIIN 00-985-7275

Support Equipment Required

Quantity	Description	Reference Number
As Required	Bottle, Wash, Polyethylene Squeeze	MS36070A
1	Goggles or Face Shield	NIIN 00-052-3776
As Required	Respirator	—

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen can cause an explosion or fire. Dust, lint and fine metal particles are also dangerous.

Use respiratory and eye protective equipment during cleaning and blow drying procedures. Do not wipe lapped parts to dry, scratches may result.

1. Clean metallic parts by using procedures outlined in NAVAIR 13-1-6.4-1. Blow dry with oil-free nitrogen.

2. After cleaning, all internal surfaces shall be examined for cleanliness. Should further contamination be found, reclean the parts in accordance with step 1.

3. Cleaned parts shall be sealed in plastic bags for storage. Bag all complete assemblies that are not immediately returned to service.

10-57. INSPECTION OF DISASSEMBLED REGULATOR.

10-58. Inspect the regulator disassembled parts in accordance with the following general instructions and table 10-10.

1. All parts supplied in kits shall be replaced each time a regulator subsystem is disassembled.

2. Inspect all metal parts for cracks, nicks, burrs, scratches or other imperfections which could cause leakage or malfunctions in the regulator.

3. Inspect all threaded areas of parts for condition and cleanliness.

4. Ensure that all parts and cavities are clean and free of foreign material.

5. Inspect identification plate for condition and legibility.

10-59. LUBRICATION.

WARNING

Do not use oil, or any material containing oil, in conjunction with oxygen equipment. Oil, even in a minute quantity, coming in contact with oxygen can cause an explosion or fire. Dust, lint or fine metal particles are also dangerous.

10-60. Parts which require lubrication, and lubricants required will be covered in the assembly portion of this section.

Materials Required

Quantity	Description	Reference Number
As Required	Christo-Lube, MCG111, Type 1	MIL-G-27617
As Required	Krytox 240 AC Lubricant	NIIN 00-961-8995 (CAGE 73925)
As Required	Sealant	Vibratite NIIN 00-163-5792 (CAGE 04866)

Table 10-10. Inspection of Disassembled Regulator Components

Nomenclature	Figure & Index No.	Inspect For	Remedy
PBA aneroid housing.	10-17-1	Damaged threads, cracked or scratched mating surfaces.	Replace if defective.
Diaphragm cover.	10-17-15	Obvious defects and scratched mating surfaces.	Replace if defective.
PBA/PBG housing.	10-17-11	Damaged threads, cracked or scratched mating surfaces.	Replace if defective.
Bell crank.	10-17-39	Damaged threads, distortion and burrs.	Replace if defective.
Bracket.	10-17-42	Obvious damage or distortion.	Replace if defective.
Inlet fitting.	10-17-45	Damaged threads.	Replace if defective.
Relief valve housing.	10-17-51	Cracked or scratched mating surfaces.	Replace if defective.
Body assy.	10-17-61	Damaged threads, cracked or scratched mating surfaces.	Replace if defective.

NOTE

All disassembled parts shall be replaced with like parts supplied in parts kits. Old parts shall be discarded.

Prior to assembly, apply a light film of Crisco-lube or Krytox to all preformed packings.

Prior to assembly, apply a small amount of Vibratite to all new screw threads (third and fourth threads only). Allow threads to cure for one to two hours at room temperature.

Refer to figure 10-17 for identification of regulator components referenced by index numbers used in the following paragraphs.

10-61. REPAIR.

10-62. Unless otherwise specified, all parts found to be damaged or defective shall be replaced. Defects on white painted surfaces may be touched up using Lacquer (MIL-L-6805).

10-63. REMOVAL OF PBG INLET FITTING. To remove a PBG fitting which has been broken off flush, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Easy-out, No. 5, 17/64 in.	NIIN 00-240-5219

NOTE

If the following steps can not be accomplished, submit a hazardous material report to Oxygen FST, COMNAVAIRWARCENACDIV Patuxent River, MD requesting an engineering investigation. Do not BCM oxygen regulator.

1. Install easy-out, no. 5, 17/64 inch into center of broken PBG inlet fitting (43, figure 10-17) using only your hand until a slight restriction is felt.

2. Using only your hand, carefuly turn easy-out counterclockwise to remove broken inlet fitting (43).

3. Install new inlet fitting (43) into regulator in accordance with procedures outlined in paragraph 10-69.

10-64. ASSEMBLY.

10-65. Assembly of the demand oxygen regulator components is essentially the reverse of disassembly, with special instructions noted. After completion of any subsystem maintenance action or when subassemblies are being assembled, complete Bench Test described in paragraphs 10-32 thru 10-42 must be successfully performed before the regulator can be returned to service.

10-66. MAIN RELIEF VALVE SUBSYSTEM. To assemble the Main Relief Valve Subsystem, and install it in the regulator, use parts kit F417-1016-3 and proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 lbs-in.	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Install preformed packing (60) on relief valve assy (57).

2. Install relief valve assy (57) in regulator body (61) and secure with two washers (59) and two screws (58). Torque screws (58) to between 5 and 6 lbs-in.

3. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-67. VEST CONNECTOR SUBSYSTEM. To assemble the Vest Connector Subsystem, use parts kit F417-1015-3 and proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 lbs-in.	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Install seat (56) and spring (55) into regulator body (61).

2. Install two preformed packings (53) on housing (51).

3. Install relief valve assembly (54) into housing (51).

4. Install housing (51) and secure with two allen head screws (52). Torque screws (52) to between 8 and 10 lbs-in.

5. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-68. INLET FITTING/FILTER SUBSYSTEM. To assemble the Inlet Fitting/Filter Subsystem, use parts kit F417-1014-3 and proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Torque, 300 lbs-in.	TE25A (CAGE 55719) NIIN 00-776-1841

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Install filter (49) in regulator body (61) with fine mesh facing up and secure with retaining ring (50).

2. Install preformed packing (48) on inlet fitting (45).

3. Install and align inlet fitting (45). Install retaining clip (47). Position retainer (46) over clip (47) and secure with one washer (13) and one screw (12). Torque screw (12) to between 8 and 10 lbs-in.

4. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-69. G-SENSING INLET SUBSYSTEM. To assemble the G-sensing Inlet Subsystem, use parts kit F417-1013-3 and proceed as follows:

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Apply one turn teflon tape MIL-T-27730 to fitting (43). Install fitting (43) onto regulator body (61) hand tight, then using a wrench, tighten fitting (43) up to one full turn or until release clip and spring of fitting (43) faces as per orientation in view A, figure 10-2, item 21.

2. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-70. DEMAND VALVE SUBSYSTEM. To assemble the Demand Valve Subsystem, use parts kit F417-1017-3 and proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Christo-Lube, MCG111, Type 1	MIL-G-27617
As Required	Compound, Leak Detection, Type 1	MIL-L-25567
As Required	Tape, Anti-seize	MIL-T-27730

Support Equipment Required

Quantity	Description	Reference Number
1	Instrument, Blunt, Non-metallic	—
1	Tool, Demand Valve	F395-1091-MT
1	Wrench, Spanner	F395-1096-MT
1	Wrench, Torque, 300 lbs-in.	TE25A (CAGE 55719) NIIN 00-776-1841
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

CAUTION

Refer to figure 10-8. Seat (30) has a lapped surface, use extreme care when handling.

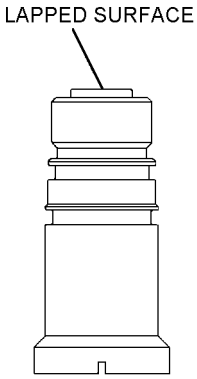


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Figure 10-8. Seat Lapped Surface Identification

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Install preformed packing (31) on seat (30).

2. Install preformed packing (33) on poppet and cable assembly (32).

3. Install preformed packing (36) on bushing (35).

4. Install preformed packing (38) on regulator body (61).

CAUTION

Prior to installation, apply a light film of Cristo-lube to the ball on poppet and cable assembly (32). Do not substitute Krytox lubricant for Cristo-lube.

5. Refer to figure 10-17 for orientation of bushing (35). Using a non-metallic blunt instrument, install bushing (35) into regulator body (61) until bushing preformed packing (36) seats.

6. Install spring (34) and spring (37) onto poppet and cable assembly (32). Using a blunt instrument, insert poppet and cable assembly (32) into bushing (35).

7. While holding poppet and cable assembly (32) in bushing (35), grasp cable to retain poppet for step 8.

CAUTION

Use extreme care while performing step 8 to prevent damage to poppet seating surface and seat (30).

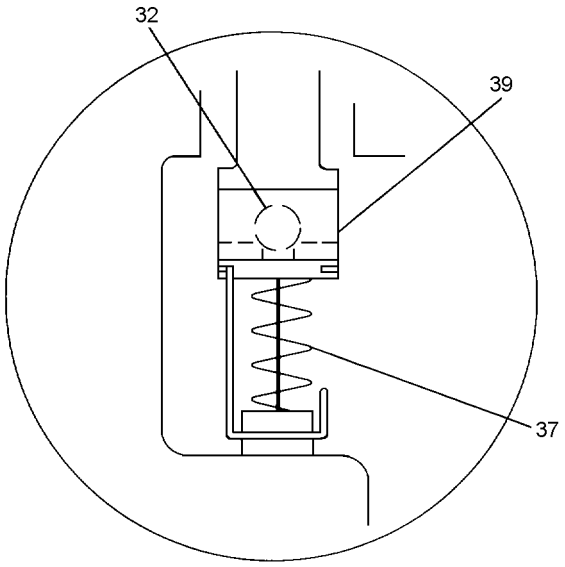
8. Using demand valve tool (10, figure 10-4), install seat (30) into regulator body (61). Turn seat (30) clockwise one and one half turns.

9. Refer to figure 10-9. Engage poppet and cable assembly (32) ball with bell crank (39) fork as shown.

10. Refer to figure 10-10. Install bracket (42) on bell crank (39) using pin (40) as shown.

NOTE

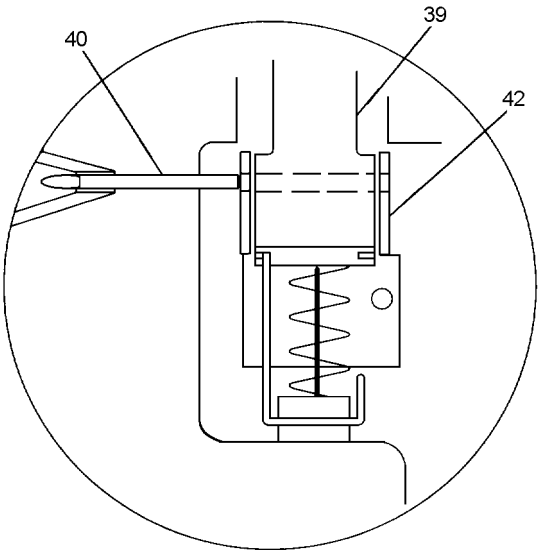
Prior to installing screw (27), align bracket (42) with locator pins in bottom of regulator housing.



RETRACT SPRING (37) AND ENGAGE CABLE (32) BALL INTO BELLCRANK (39) FORK

010009

Figure 10-9. Cable Ball and Bell Crank Fork Assembly



ALIGN HOLES IN BELLCRANK (39) AND BRACKET (42). INSTALL PIN (40) WITH TWEEZERS.

010010

Figure 10-10. Bracket and Bell Crank Assembly

11. Using screw (27), install bracket (42) on regulator body (61). Torque screw (27) to between 2 and 3 lbs-in.

CAUTION

To prevent damage to poppet and cable assembly (32), depress bellcrank assembly prior to adjusting demand valve seat (30).

12. Using demand valve tool (10, figure 10-4), turn seat (30) until it bottoms, then turn counterclockwise one half turn.

NOTE

Because screen (28) orientation causes varying amounts of back pressure at high flow, it may be necessary to reposition it during testing.

13. Refer to figure 10-11. Position screen (28) in demand valve seat (30) as shown and secure with retaining ring (29).

14. Perform demand valve leakage test.

a. Connect regulator breathing gas inlet to test stand N_2 INPUT connection (18).

b. Ensure all test stand valves are secured.

c. Open N_2 supply cylinder.

d. Turn INLET PRESS. VALVE (L) on.

e. Adjust LOW PRESS. Regulator (N) until N_2 INPUT PRESS. gage (27) indicates 50 psig.

f. Depress arm on bell crank (39) to ensure flow through regulator and release arm on bell crank (39), flow through regulator should stop. Apply film of leakage detection compound to regulator outlet. No leakage should be detected or allowed. Repeat this procedure two times before proceeding to step g.

g. If leakage is observed during step f, disassemble demand valve and reassemble demand valve assembly in accordance with steps 1 through 13 and then repeat leakage test described in step f.

h. Secure test stand and disconnect regulator from N_2 INPUT connection (18).

CAUTION

After performing step 15, ensure diaphragm (26) is secured on arm of bell crank (39) by carefully pulling diaphragm (26) up and away from regulator main body.

NOTE

Index marks are provided on regulator body to assist in radial orientation of diaphragm (26). Refer to figure 10-12.

15. Carefully engage diaphragm (26) stirrup with bell crank (39) arm. (Orientation to be approximately 90°).

16. Install packing (14) on PBA/PBG housing (11).

17. Position spring (25) on diaphragm (26).

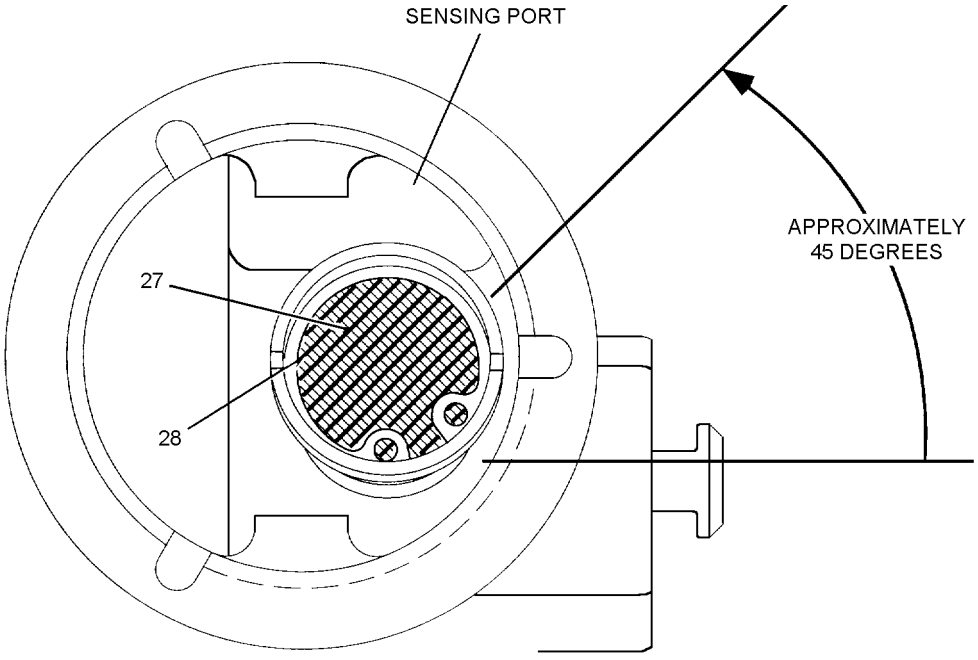
NOTE

Any orientation of PBA/PBG housing is acceptable. Do not rotate PBA/PBG housing during assembly. Diaphragm (26) may be damaged.

18. Carefully install PBA/PBG housing (11) and retainer (46) on regulator body (61) and secure with four washers (13) and four screws (12). Torque screws (12) to between 8 and 10 lbs-in.

19. Install filter screen (7) on PBA/PBG housing and secure with retaining ring (10).

20. Install preformed packing (38) supplied with parts kit in regulator outlet.

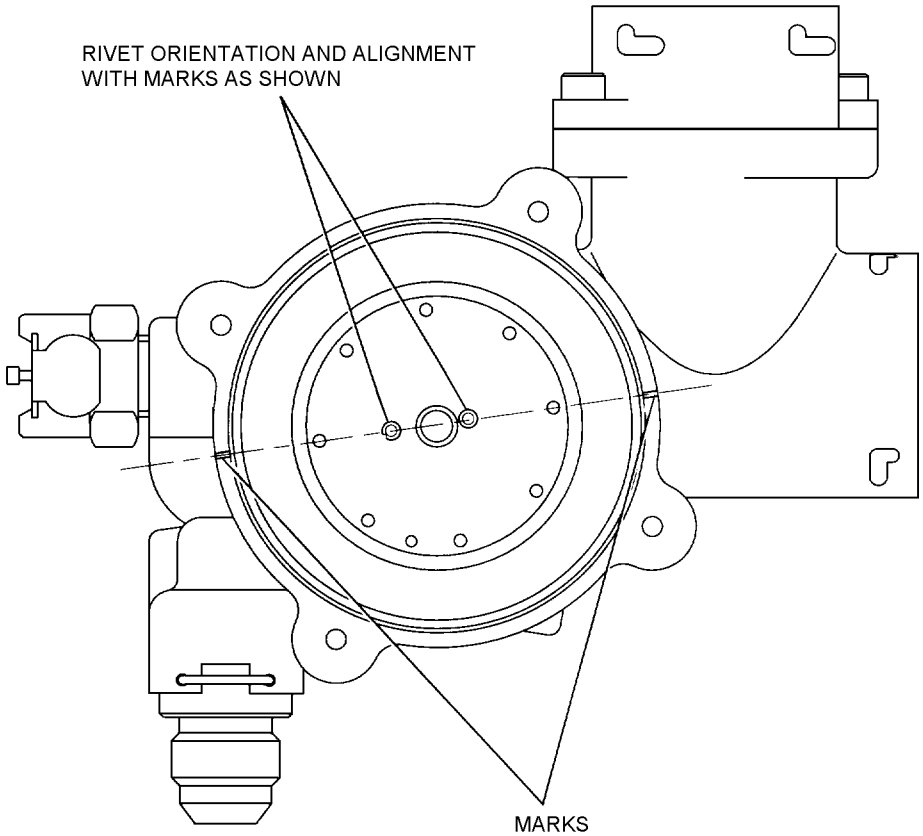


NOTE

FOR EASE OF ACCESS, THE RETAINING RING SHOULD
ALSO BE LOCATED APPROXIMATELY AS SHOWN.

010011

Figure 10-11. Screen Initial Orientation



010012

Figure 10-12. Diaphragm Orientation

10-71. PBG SUBSYSTEM. To assemble the PBG Subsystem, use parts kit F417-1012-3 and proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Alcohol, Isopropyl	TT-I-735 NIIN 00-655-8366

Support Equipment Required

Quantity	Description	Reference Number
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

NOTE

Refer to figure 10-17 for identification of regulator components referenced by index numbers in this procedure.

1. Insure preformed packing (24) and preformed packing (23) are on PBG bellows (22).

2. Install bellows (22) in PBA/PBG housing (11).

CAUTION

Refer to figure 10-13. Valve (19) has a lapped surface, use extreme care when handling.

3. Insure check valve (18) is installed on valve (19) as shown in figure 10-14. Cut check valve (18) tabs flush with surface of valve (19). Rinse assembly in alcohol.

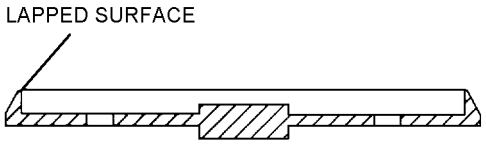


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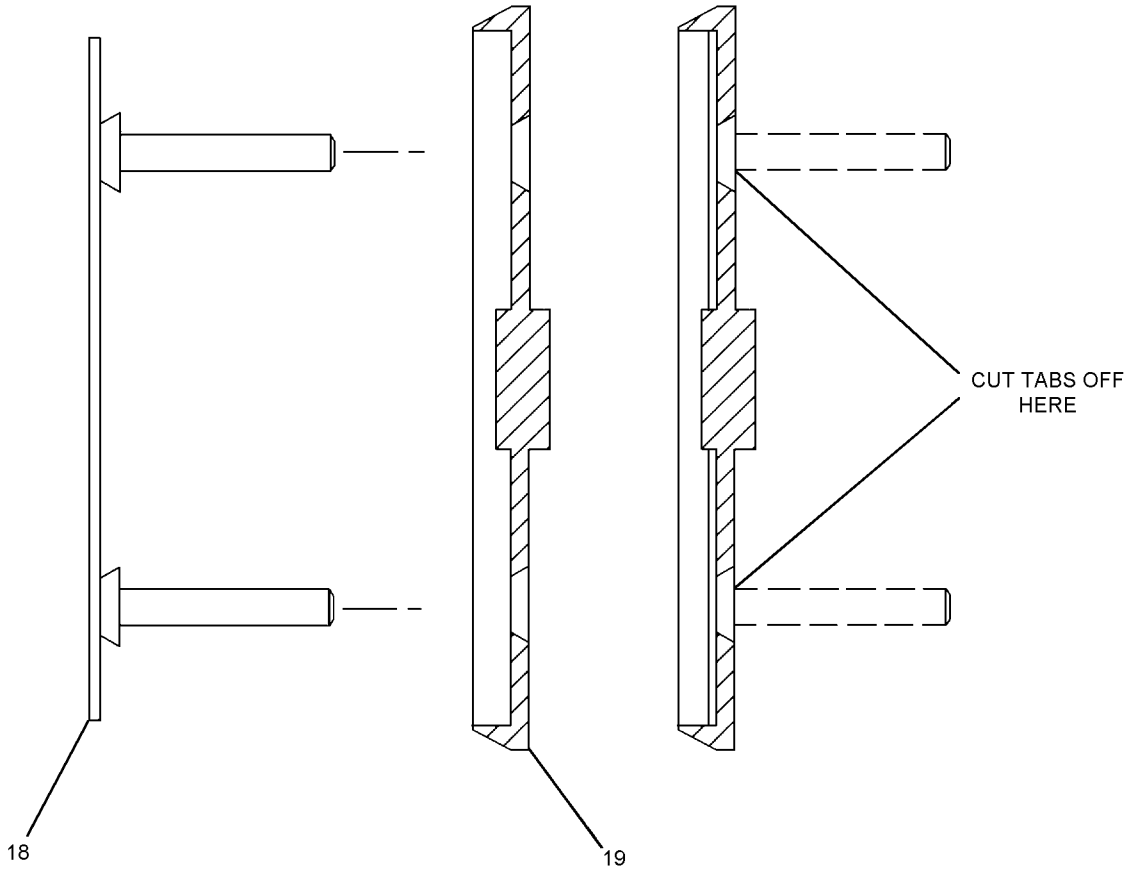
Figure 10-13. Valve Lapped Surface Identification



010014

Figure 10-14. Check Valve Installation on Valve

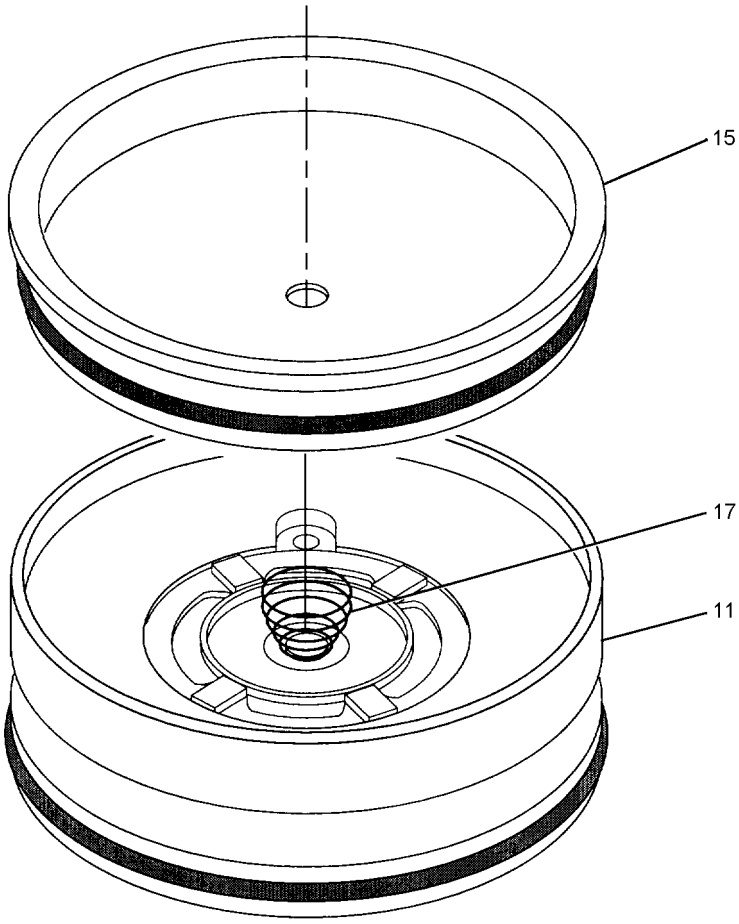
4. Install diaphragm (21), bushing (20), PBG valve (19) and check valve (18) and spring (17).

CAUTION

Refer to figure 10-7. Diaphragm Cover (15) has a lapped surface, use extreme care when handling.

5. Install preformed packing (16) on diaphragm cover (15). Refer to figure 10-15 and insure diaphragm cover (15) seating area is centered on conical spring (17) as shown. Install diaphragm cover (15) on PBA/PBG housing (11).

6. Install packing (14) on PBA/PBG housing (11).



NOTE

ALIGN HOLE IN DIAPHRAGM COVER (15) WITH CENTER OF SPRING (17). GENTLY PRESS DIAPHRAGM COVER (15) INTO PBA/PBG HOUSING (11).

010015

Figure 10-15. Diaphragm Cover Alignment

NOTE

Any orientation of PBA/PBG housing is acceptable. Do not rotate PBA/PBG housing during assembly. Diaphragm (26) may be damaged.

7. Install spring (25) on diaphragm (26).

8. Carefully install PBA/PBG housing (11) and retainer (46) on regulator body (61) and secure with four washers (13) and four screws (12). Torque screws (12) to between 8 and 10 lbs-in.

9. Install filter screen (7) on PBA/PBG housing and secure with retaining ring (10).

10. Install ball (9) and spring (8). Install second filter screen (7) on PBA/PBG housing and secure with second retaining ring (10).

11. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-72. PBA SUBSYSTEM. To assemble the PBA Subsystem, use parts kit F417-1011-3 and proceed as follows:

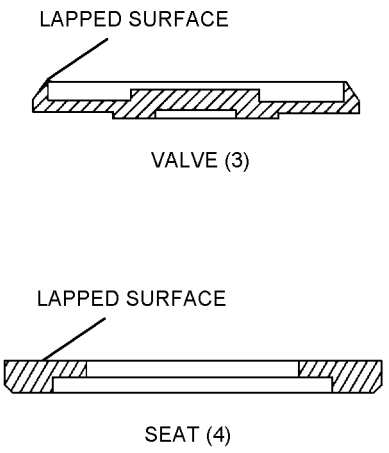
Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, Spanner	F395-1096-MT
1	Pliers, Snap-Ring	E700ACG (Snap-On Tools, Inc.)

1. Install PBA aneroid (2) in PBA aneroid housing (1). (Top of screw to be flush with housing.)

CAUTION

Refer to figure 10-16. Valve (3) and seat (4) have lapped surfaces, use extreme care when handling.



010016

Figure 10-16. Valve and Seat Lapped Surface Identification

2. Install preformed packing (5) on seat (4).

3. Install seat (4), spring (6) and valve (3) into PBA/PBG housing (11).

4. Install PBA aneroid housing (1) on PBA/PBG housing and secure with spanner wrench (9, figure 10-4).

5. Install preformed packing (38) supplied with parts kit in regulator outlet.

10-73. TESTING. After completion of any subsystem maintenance action, the complete Bench Test, described in paragraphs 10-32 thru 10-43, must be successfully performed before the regulator can be returned to service.

Section 10-5. Illustrated Parts Breakdown

10-74. GENERAL.

10-75. This section lists and illustrates the procurable parts of the Demand Oxygen Regulator Type CRU-103/P (P/N F241-2300-3).

10-76. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

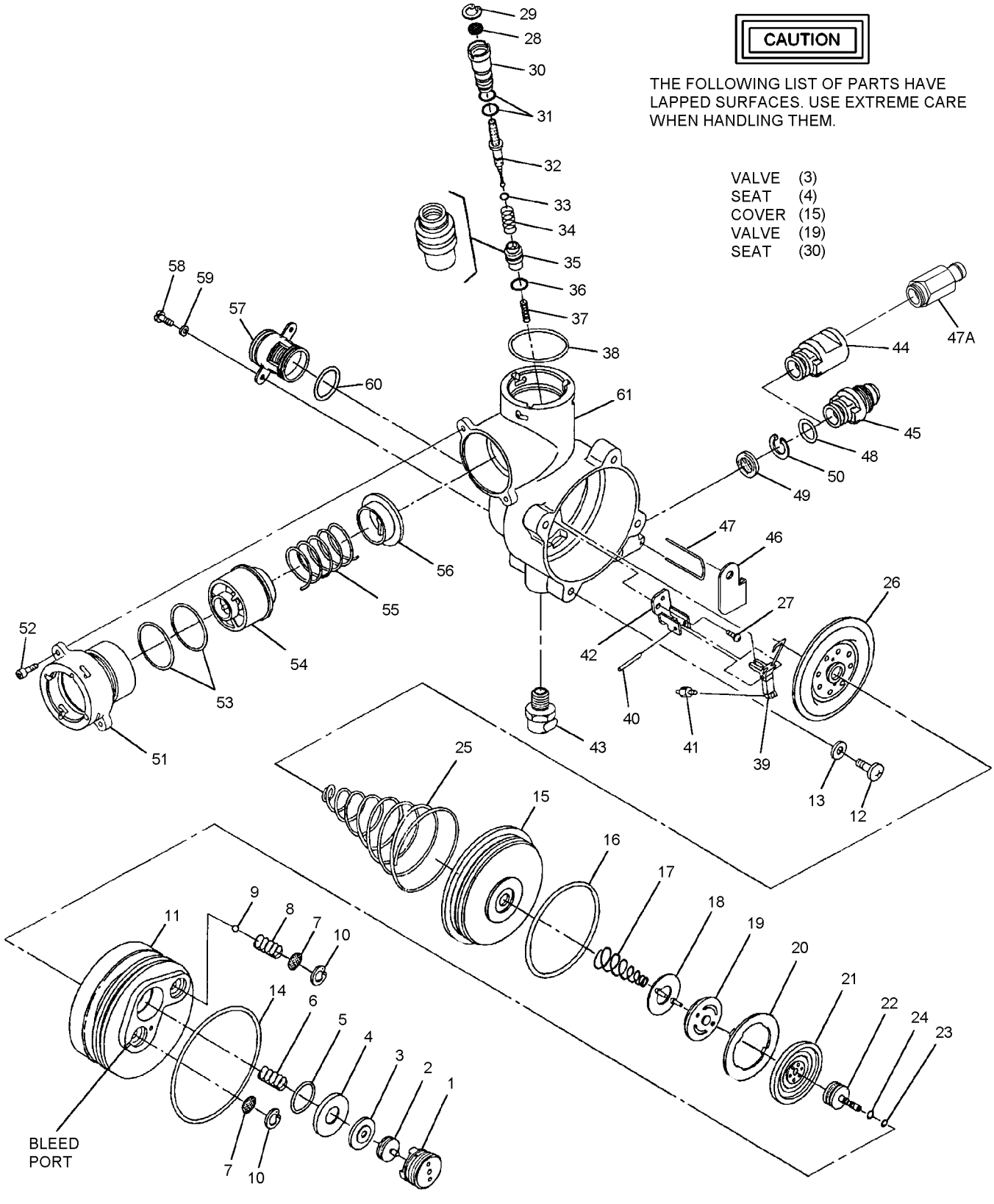


Figure 10-17. Demand Oxygen Regulator, CRU-103/P

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
10-17	F241-2300-3	REGULATOR, Oxygen, Demand (Type CRU-103/P) (Parts Kits Available)	REF	
-1	F395-1096-1	. HOUSING, Aneroid (PBA)		
-2	F395-1095-1	. ANEROID ASSEMBLY (PBA)	1	
-3	F395-1097-1	. VALVE (PBA)	1	
-4	F395-1098-1	. SEAT (PBA)	1	
-5	F337-1146-10	. PACKING, Preformed (PBA)	1	
-6	F258-1336-1	. SPRING, Compression (PBA)	1	
-7	14011-1	. SCREEN, Filter (PBG)	2	
-8	B41407-1	. SPRING (PBG)	1	
-9	B41406-1	. BALL (PBG)	1	
		(ATTACHING PARTS)		
-10	MS16629-4045	. RING (PBG)	2	
		---*---		
-11	F395-1099-1	. HOUSING, (PBA/PBG)	1	
		(ATTACHING PARTS)		
-12	MS51957-26	. SCREW (PBG)	4	
-13	F281-1030-15	. WASHER, Flat (PBG)	4	
		---*---		
-14	FS5701-032	. PACKING, Preformed (PBG, DV)	1	
-15	F395-1094-1	. COVER, Diaphragm	1	
-16	FS5701-032	. PACKING, Preformed (PBG)	1	
-17	F5539072	. SPRING, Conical (PBG)	1	
-18	F334-1066-1	. VALVE, Check (PBG)	1	
-19	F395-1078-1	. VALVE (PBG)	1	
-20	F395-1085-1	. BUSHING, Diaphragm (PBG)	1	
-21	F395-1088-1	. DIAPHRAGM ASSEMBLY (PBG)	1	
-22	F395-1086-1	. BELLOWS ASSEMBLY (PBG)	1	
-23	F337-1146-5	. PACKING, Preformed (PBG)	1	
-24	F337-1146-6	. PACKING, Preformed (PBG)	1	
-25	B41023-1	. SPRING, Conical (DV)	1	
-26	F395-1093-1	. DIAPHRAGM ASSEMBLY (DV) (Note 2)	1	
-27	MS51957-2	. SCREW (DV)	1	
-28	14011-1	. SCREEN, Filter (DV)	1	
		(ATTACHING PARTS)		
-29	MS16629-4045	. RING (DV)	1	
		---*---		
-30	F395-1091-1	. SEAT, Demand valve (DV)	1	
-31	F337-1146-4	. PACKING, Preformed (DV)	2	
-32	F395-1054-1	. POPPET AND CABLE ASSEMBLY (DV)	1	
-33	F337-1146-9	. PACKING, Preformed (DV)	1	
-34	F258-1333-1	. SPRING, Compression (DV)	1	
-35	F395-1118-1	. BUSHING, Demand valve (DV)	1	
-36	F337-1146-3	. PACKING, Preformed (DV)	1	
-37	F258-1332-1	. SPRING (DV)	1	
-38	MS29513-021	. PACKING (PBA, PBG, GST, IF, VC, RV, DV)	1	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
10-17-39	F395-1052-1	. BELL CRANK ASSEMBLY	1	
		(ATTACHING PARTS)		
-40	F395-1112-1	. PIN, Pivot, valve stem (DV)	1	
		---*---		
-41	F395-1111-1	. SETSCREW, Adjustment, relief valve	1	
-42	F395-1114-1	. BRACKET, Valve stem	1	
-43	B41413-1	. FITTING ASSEMBLY, Inlet, G-sensing, QD (GSI)	1	
-44	B40918-1	. FITTING, Inlet, Oxygen (Alternate) (LOX)	1	
-45	F395-1106-1	. FITTING, Inlet, Oxygen (OBOGS)	1	
		(ATTACHING PARTS FOR ITEMS 44 AND 45)		
-46	F395-1190-1	. RETAINER (IF)	1	
-47	F281-1137-1	. CLIP, Retaining (IF)	1	
		---*---		
-47A	36728-01	. FITTING, Inlet, Oxygen (E-2C only) (Note 1)	1	
-48	FS5701-012	. PACKING, Preformed (IF)	1	
-49	F395-1105-1	. FILTER ASSEMBLY (IF)	1	
		(ATTACHING PARTS)		
-50	MS16629-4045	. RING (IF)	1	
		---*---		
-51	F395-1157-1	. HOUSING, Relief valve	1	
		(ATTACHING PARTS)		
-52	NAS1352C06 LB6B	. SCREW (VC)	2	
		---*---		
-53	MS29513-022	. PACKING (VC)	2	
-54	F395-1153-2	. VALVE ASSEMBLY, Relief (VC)	1	
-55	F258-1313-1	. SPRING (VC)	1	
-56	F395-1156-1	. SEAT, Spring and pin (VC)	1	
-57	B40912-1	. VALVE ASSEMBLY, Relief (RV)	1	
		(ATTACHING PARTS)		
-58	MS35275-213	. SCREW (RV)	2	
-59	MS35338-135	. WASHER (RV)	2	
		---*---		
-60	F337-1146-1	. PACKING, Preformed (RV)	1	
-61	F395-1103-1	. BODY SUBASSEMBLY, Regulator	1	
	F417-1011-3	PARTS KIT, PBA Subsystem (PBA)	REF	
	F417-1012-3	PARTS KIT, PBG Subsystem (PBG)	REF	
	F417-1013-3	PARTS KIT, G-sensing (GSI)	REF	
	F417-1014-3	PARTS KIT, Inlet Fitting (IF)	REF	
	F417-1015-3	PARTS KIT, Vest Connector (VC)	REF	
	F417-1016-3	PARTS KIT, Main Relief Valve (RV)	REF	
	F417-1017-3	PARTS KIT, Demand Valve (DV)	REF	

Figure and Index Number	Part Number	Description 1 2 3 4 5 6 7	Units Per Assembly	Usable On Code
		Notes: 1. Item 47A is not a component of the CRU-103/P oxygen regulator. It is a special inlet fitting designed specifically for the E-2C aircraft. This item must be open purchased from Scott Aviation (CAGE 53655), Buffalo, NY. 2. Diaphragm assembly, P/N F395-1093-1 can either be obtained by ordering demand valve kit, P/N F417-1017-3 or ordering the diaphragm assembly, P/N F395-1093-1 as an individual item under NSN 1660-01-515-2334 (be sure to indicate quantity).		

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NUMERICAL INDEX

Part Number	Figure and Index Number	SM&R Code
B40912-1	10-17-57	KF
B40918-1	10-17-44	PAGZZ
B41023-1	10-17-25	KF
B41406-1	10-17-9	KF
B41407-1	10-17-8	KF
B41413-1	10-17-43	KF
FS5701-012	10-17-48	KF
FS5701-032	10-17-14	KF
	10-17-16	KF
F241-2300-3	10-17	PAOGG
F258-1313-1	10-17-55	KF
F258-1332-1	10-17-37	KF
F258-1333-1	10-17-34	KF
F258-1336-1	10-17-6	KF
F281-1030-15	10-17-13	KF
F281-1137-1	10-17-47	KF
F334-1066-1	10-17-18	KF
F337-1146-1	10-17-60	KF
F337-1146-10	10-17-5	KF
F337-1146-3	10-17-36	KF
F337-1146-4	10-17-31	KF
F337-1146-5	10-17-23	KF
F337-1146-6	10-17-24	KF
F337-1146-9	10-17-33	KF
F395-1052-1	10-17-39	PAGZZ
F395-1054-1	10-17-32	KF
F395-1078-1	10-17-19	KF
F395-1085-1	10-17-20	KF
F395-1086-1	10-17-22	KF
F395-1088-1	10-17-21	KF
F395-1091-1	10-17-30	KF
F395-1093-1	10-17-26	KF
F395-1094-1	10-17-15	PAGZZ
F395-1095-1	10-17-2	KF
F395-1096-1	10-17-1	PAGZZ
F395-1097-1	10-17-3	KF
F395-1098-1	10-17-4	KF
F395-1099-1	10-17-11	PAGZZ
F395-1103-1	10-17-61	XA
F395-1105-1	10-17-49	KF
F395-1106-1	10-17-45	PAGZZ
F395-1111-1	10-17-41	PAGZZ
F395-1112-1	10-17-40	KF
F395-1114-1	10-17-42	PAGZZ
F395-1118-1	10-17-35	KF
F395-1153-2	10-17-54	KF
F395-1156-1	10-17-56	KF
F395-1157-1	10-17-51	PAGZZ
F395-1190-1	10-17-46	KF
F417-1011-3	10-17	PAGZZ
F417-1012-3	10-17	PAGZZ
F417-1013-3	10-17	PAGZZ
F417-1014-3	10-17	PAGZZ
F417-1015-3	10-17	PAGZZ
F417-1016-3	10-17	PAGZZ
F417-1017-3	10-17	PAGZZ
F5539072	10-17-17	KF
MS16629-4045	10-17-10	KF
	10-17-29	
	10-17-50	
MS29513-021	10-17-38	KF
MS29513-022	10-17-53	KF
MS35275-213	10-17-58	KF
MS35338-135	10-17-59	KF
MS51957-2	10-17-27	KF
MS51957-26	10-17-12	KF
NAS1352C06LB6B	10-17-52	KF
14011-1	10-17-7	KF
	10-17-28	
36728-01	10-17-47A	

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